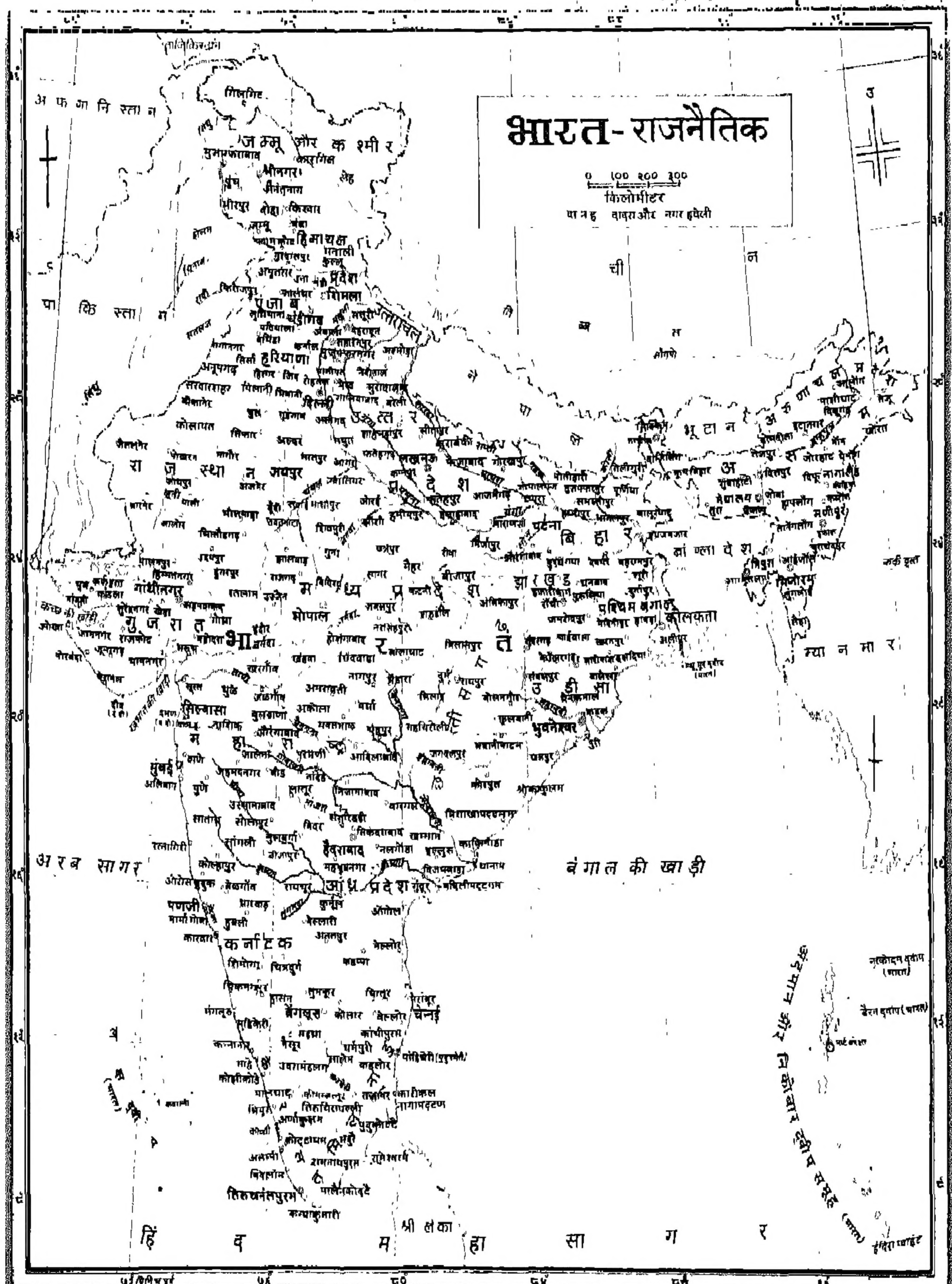

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उत्तरांचल
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अरुणाचल प्रदेश
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भुवनेश्वर
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सिल्वासा
मुंबई
हैदराबाद
आंध्र प्रदेश
पणजी
कर्नाटक
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अंडमान और निकोबार द्वीप समूह

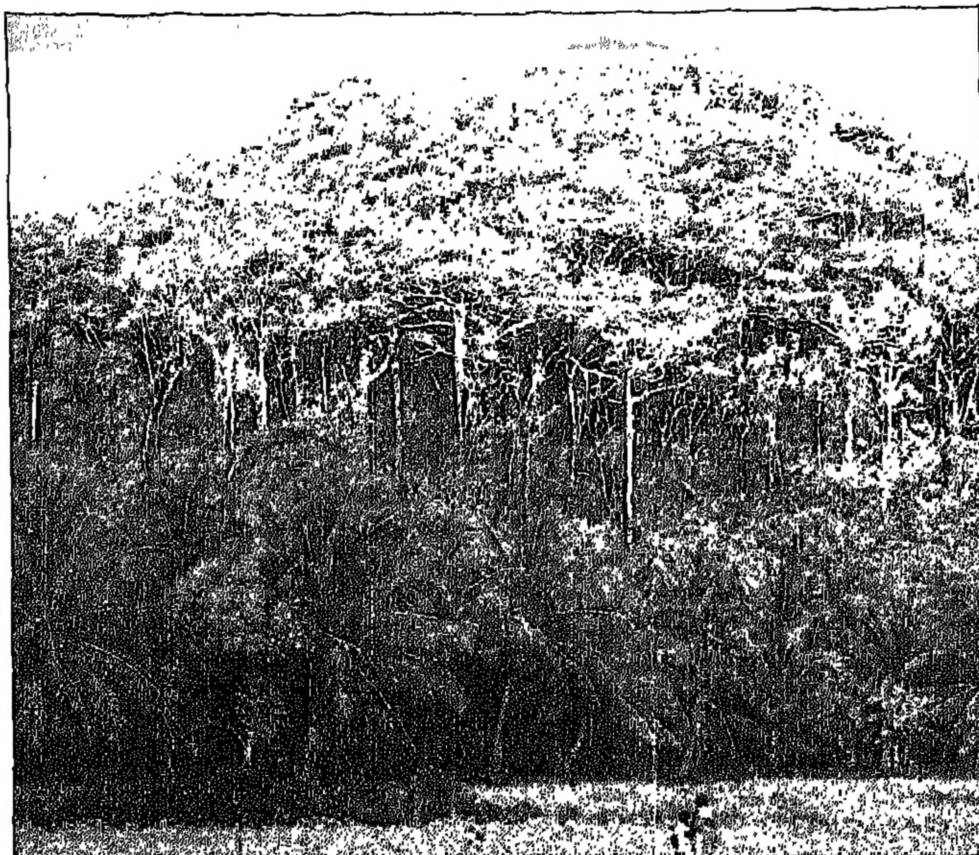
भारत-प्राकृतिक



किलोमीटर

ऊँचाई मीटर में
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० समुद्र सतह

भारतीय महामरुस्थल
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सतलज
दिल्ली
जयपुर
मालवा पठार
बुंदेलखंड
छोटा नागपुर
पारसनाथ
कोलकाता
पटना
ब्रह्मपुत्र
गंगा
नर्मदा
ताप्ती
महानदी
गोदावरी
अरब सागर
बंगाल की खाड़ी
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हिं द म हा सा ग र



उष्ण कटिबंधीय सदाबहार वन



धान की खेती

भूगोल

कक्षा दसवीं



महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ,
पुणे

प्रथमावृत्ति : १९९५
पुनर्मुद्रण : २००४

अभ्यास मंडल सदस्य :
प्रा. भालचंद्र ज. जेऊरकर (निमंत्रक)
प्राचार्य श्रीधर बा. चिंचमलातपुरे
डा. जयकुमार के. मगर
प्रा. कमलाकर ध. माने
श्री अंबादास गु. अवस्थी
श्री दत्तात्रय ब. पाटील–सलगरकर
श्री प्रभाकर का. राणे

लेखक मंडल सदस्य :
प्रा. कृष्णराव त्र्यं. कोलते
प्रा. केशव आ. उके
डा. चंद्रकांत ता. पवार
डा. शंकर रा. चौधरी

समन्वयक :
प्रा. लक्ष्मण र. मालुसरे

भाषांतरकार व समीक्षक :
डा. उदयराज उपाध्याय
श्री. प्रेमनाथ मिश्रा

भाषांतर समन्वयक :
श्री. स्वामीनाथ सिंह

मानचित्रकार :
श्री. गो. ना. कांबळे

निर्मिति :
श्री. प्रमोद शिरोडकर,
मुख्यनिर्मिती अधिकारी
श्री. सुनील कसबेकर
निर्मिती अधिकारी

कागज :
५८.५ × ८६ सेमी,
५७ जी.एस.एम्., क्रीम वोव्ह

फोटो टाइप सेटिंग :
वरदा ऑफसेट
अँड टाईप सेटर्स, अंधेरी, मुंबई

मुद्रक :
TRIMURTI PRINTERS
5, SECTOR-D, SANWER ROAD
INDORE (M.P.) PH : 2721548

मुद्रणादेश :
N/Tech/2004-05/21 (14000)
Dt. 27.02.04

प्रस्तुत पुस्तक 'माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ' की नीति योजना के अनुसार अभ्यास मंडल के मार्गदर्शन में लेखक मंडल ने तैयार की।

प्रस्तावना

राष्ट्रीय शैक्षिक अनुसंधान एवं प्रशिक्षण परिषद द्वारा तैयार किए गए पाठ्यक्रम का महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ ने पूर्णतः अध्ययन किया है।

इस पाठ्यपुस्तक पर विचार करते समय राष्ट्रीय शिक्षा नीति के केंद्रीय घटकों में से जो, भूगोल विषय से संबंधित हैं, उनका समावेश प्रस्तुत पुस्तक में किया गया है।

कक्षा १०वीं के छात्रों का आयु-वर्ग ध्यान में रखते हुए महाराष्ट्र की भौगोलिक परिस्थिति के अनुसार इसमें अंशतः परिवर्तन किया गया है।

कक्षा ९वीं में विद्यार्थियों ने भूगोल के विविध घटकों का अध्ययन किया है। भौगोलिक शब्दावली, संकल्पना तथा तत्वों की संक्षिप्त जानकारी उनको मिली है। उस अभ्यासक्रम की पृष्ठभूमि पर कक्षा १० वीं की पाठ्यपुस्तक में भारत की भौगोलिक जानकारी दी गई है। भारत के प्राकृतिक विभाग, जलवायु, जल, वन, खनिज-संपत्ति, पशु-संपत्ति तथा कृषि, उद्योग-धंधे, यातायात, संचार माध्यम, व्यापार, जनसंख्या आदि घटकों की जानकारी इस पुस्तक में दी गई है।

माध्यमिक शिक्षण स्तर पर विद्यार्थियों के भौगोलिक ज्ञान का आधार दृढ़ हो, अभ्यासक्रम के इस उद्देश्य को ध्यान में रखकर इस पुस्तक में 'क्षेत्र अभ्यास' नामक नया घटक पहले-पहल समाविष्ट किया गया है। इससे विद्यार्थी निरीक्षण द्वारा भौगोलिक संकल्पना की जानकारी प्राप्त करेंगे। ऐसी अपेक्षा है कि क्षेत्र अभ्यास के द्वारा विद्यार्थी कार्यकुशल होंगे तथा उनमें स्वतः अध्ययन की इच्छा उद्भूत होगी।

इस पुस्तक को लिखते समय अद्यतन सांख्यकी, मानक संदर्भग्रंथ तथा मानचित्रावली आदि को आधार बनाया गया है। विशेष नामों के लिए शासकीय भौगोलिक शब्दकोश का उपयोग किया गया है।

विद्यार्थी पाठ्यांश को भली-भाँति समझें इसके लिए मानचित्र, चित्र, आरेख, आकृति तथा छायाचित्रों का समावेश किया गया है। ऐसी आशा है कि मानचित्र पठन द्वारा विद्यार्थियों को भारत का भौगोलिक ज्ञान प्राप्त होगा। ऐसा अनुमान है कि विविध सांख्यकीय जानकारी, आरेख तथा आकृतियों की सहायता से स्पष्ट की गई यह पुस्तक विद्यार्थियों को समझने में अधिक सुविधाजनक होगी।

इस पाठ्यपुस्तक का प्रारूप अनेक मान्य भूगोल तथा शिक्षा विशेषज्ञों को दिखाकर, उनके द्वारा प्राप्त अभिप्रायों और सुधारों पर विचार किया गया है। पाठ्यपुस्तक के पाठ्यांश और अपेक्षित कालांशों को ध्यान में रखकर अध्यापको के अध्यापन कार्य को सहज बनाने का प्रयत्न किया गया है। अंततः बल इस बात पर है कि छात्र ही पाठ्यपुस्तक का केंद्रबिंदु है।

पाठ्यपुस्तक तैयार करने के लिए भूगोल और भूविज्ञान अभ्यास मंडल के सदस्य, लेखक, समन्वयक, चित्रकार, मानचित्र विशेषज्ञ, समीक्षक, छायाचित्रकार, भाषांतरकार, भाषांतर समन्वयक आदि का बहुमूल्य सहयोग प्राप्त हुआ है। अंततः मंडळ इसके लिए इन सबका आभारी है।

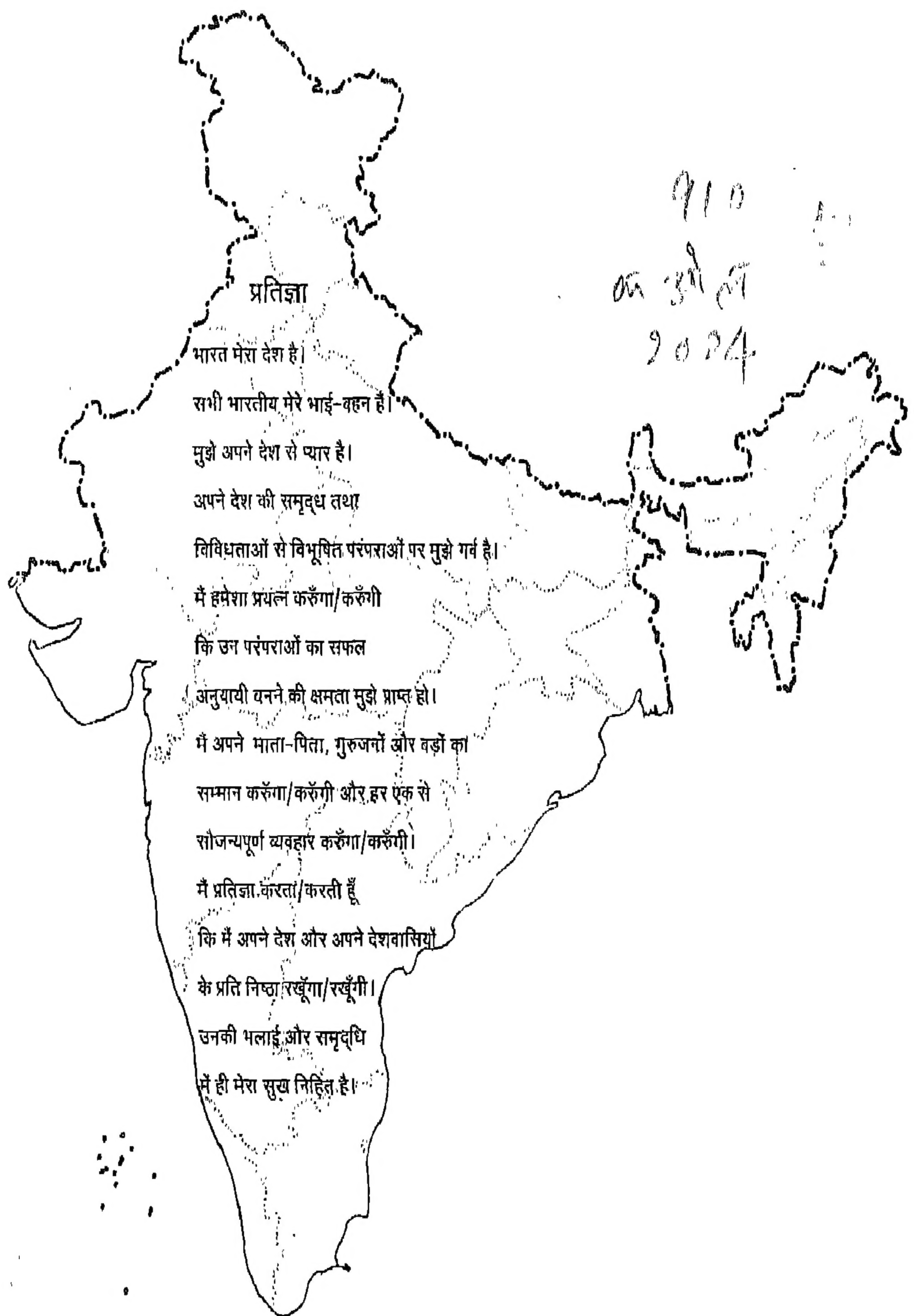
'महाराष्ट्र राज्य पाठ्यपुस्तक निर्मिती व अभ्यासक्रम संशोधक मंडळ' के संचालक और सहयोगियों द्वारा जो योगदान प्राप्त हुआ है, उसके लिए उन्हें मंडळ की ओर से हार्दिक धन्यवाद।

(श्री वसंत पाटील)
अध्यक्ष
महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ व अपर शिक्षण संचालक, महाराष्ट्र राज्य, पुणे-४११ ००५

पुणे-४११ ००५
दिनांक : ९ सितंबर १९९४
शके १८ भाद्रपद १९१३

प्रकाशक :
सचिव :
महाराष्ट्र राज्य माध्यमिक व उच्च माध्यमिक शिक्षण मंडळ, पुणे - ४११ ००५

निर्मिति व वितरण :
महाराष्ट्र राज्य पाठ्यपुस्तक निर्मिति व अभ्यासक्रम संशोधन मंडळ, पुणे-४११ ००४.



प्रतिज्ञा
भारत मेरा देश है।
सभी भारतीय मेरे भाई-बहन हैं।
मुझे अपने देश से प्यार है।
अपने देश की समृद्ध तथा
विविधताओं से विभूषित परंपराओं पर मुझे गर्व है।
मैं हमेशा प्रयत्न करूँगा/करूँगी
कि उन परंपराओं का सफल
अनुयायी बनने की क्षमता मुझे प्राप्त हो।
मैं अपने माता-पिता, गुरुजनों और बड़ों का
सम्मान करूँगा/करूँगी और हर एक से
सौजन्यपूर्ण व्यवहार करूँगा/करूँगी।
मैं प्रतिज्ञा करता/करती हूँ
कि मैं अपने देश और अपने देशवासियों
के प्रति निष्ठा रखूँगा/रखूँगी।
उनकी भलाई और समृद्धि
में ही मेरा सुख निहित है।

अनुक्रमणिका

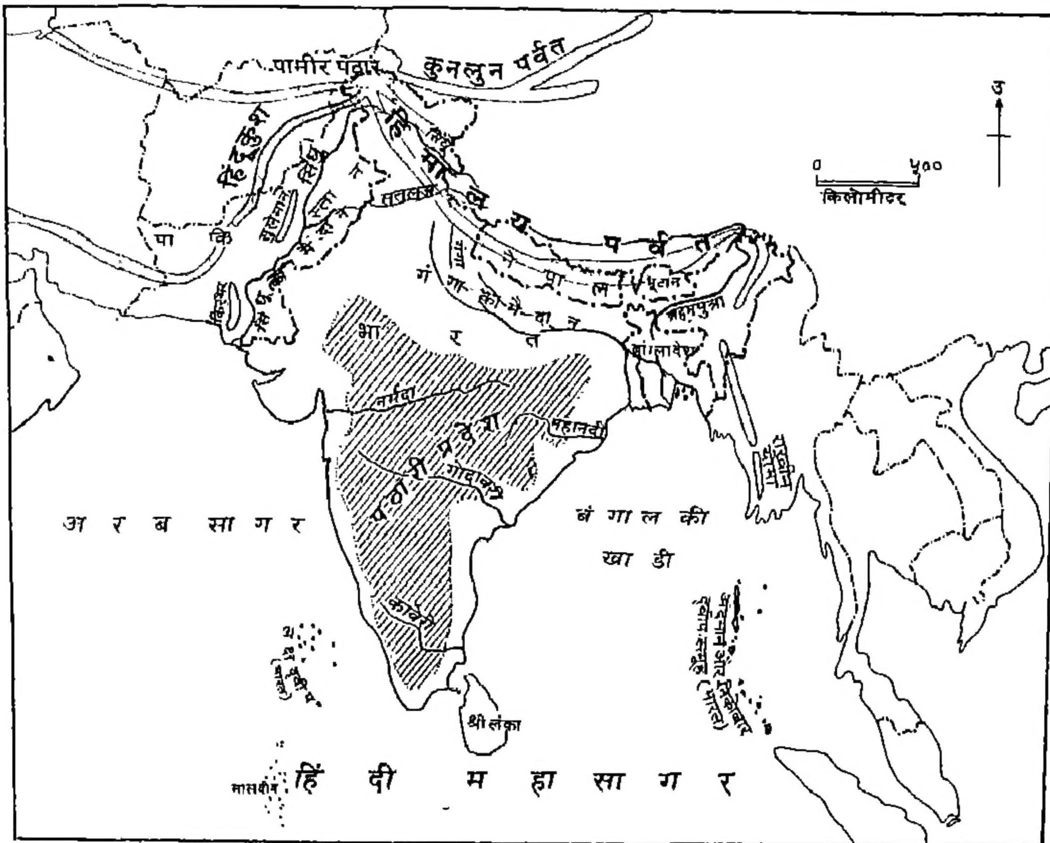
प्रकरण १

भारत तथा भारतीय उपमहाद्वीप

एशिया महाद्वीप में भारत एक प्रमुख राष्ट्र है। इसका भौगोलिक विस्तार विशाल है। एशिया महाद्वीप की किरथर, सुलेमान, काराकोरम, हिमालय, राखिनेयोमा आदि ऊँची पर्वत श्रेणियों के कारण इसका दक्षिणी भाग एशिया के मुख्य भूभाग से अलग-थलग दीखता है। यह भाग एशिया-उपमहाद्वीप के रूप में जाना जाता है। इस उपमहाद्वीप का अधिकतर प्रदेश भारत में व्याप्त है। इसीलिए इसे **'भारतीय उपमहाद्वीप'** कहा जाता है।

भारतीय उपमहाद्वीप की विशेषताएँ :

उत्तर की उत्तुंग पर्वत श्रेणियों ने भारतीय उपमहाद्वीप का निरालापन सुरक्षित रखा है। इनके कारण उत्तर की अत्यंत शीत हवाओं से इस प्रदेश का संरक्षण हुआ है। साथ ही विदेशी आक्रामक भी यहाँ सरलता से नहीं आ सके। अतः भारतीय उपमहाद्वीप के लोगों की एक संस्कृति का यहाँ उद्‌भव और विकास हुआ। सहस्त्रों वर्षों के परस्पर साहचर्य के कारण भिन्न-भिन्न मानव समूह अपनी-अपनी विशेषताओं के साथ यहाँ रहे और एक समन्वित आचार-विचारों की भारतीय संस्कृति के अंग बने।



आकृति १.१ : भारतीय उपमहाद्वीप

उत्तर की ओर पर्वत श्रेणियों के होने के कारण भारतीय उपमहाद्वीप एक वैशिष्ट्यपूर्ण भौगोलिक क्षेत्र बन गया है। इसके दक्षिण में विस्तृत हिंद महासागर है। मध्य एशिया का महाद्वीपांतर्गत विस्तृत प्रदेश, पर्वत श्रेणियों की दिशा, हिंद महासागर की समीपता आदि विशिष्ट स्थिति के परिणामस्वरूप मानसूनी जलवायु का निर्माण हुआ है। साथ ही इस उपमहाद्वीप के पश्चिम में दक्षिणी-पश्चिमी एशिया का मरुस्थली प्रदेश और पूर्व में दक्षिणी पूर्वी एशिया का अधिक वर्षा का प्रदेश निर्मित हुआ है।

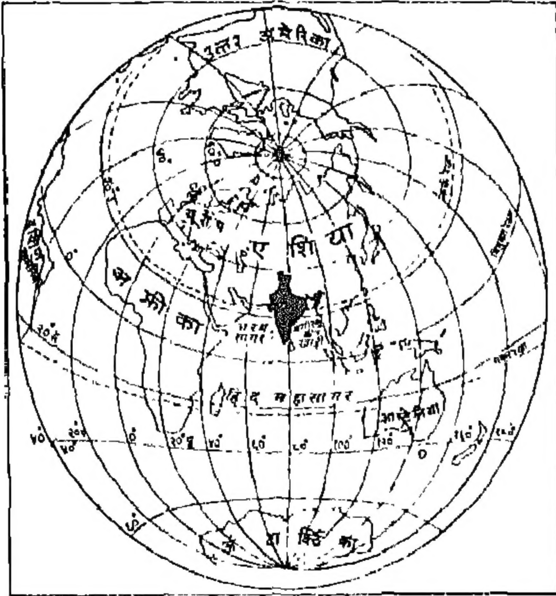
मानसूनी जलवायु तथा उससे संबंधित वनस्पति और प्राणी की सहायता से यहाँ एक समृद्ध मानव जीवन पद्धति का विकास हुआ। वर्षा की अधिकतर मात्रा को वर्ष के चार महीनों में प्राप्त करने वाले इस प्रदेश में खरीफ और रबी की विशेषतापूर्ण फसलें होती हैं। भारतीय उपमहाद्वीप के लोगों का जीवन प्रमुखतः कृषि-व्यवसाय पर अवलंबित है।

भारतीय उपमहाद्वीप में भारत, पाकिस्तान, नेपाल, भूटान, बांग्लादेश, श्रीलंका तथा मालदीय राष्ट्रों का समावेश होता हैं। समान भौगोलिक परिस्थिति तथा उसके परिणाम को अनुभव करने वाले इन राष्ट्रों की समस्याएँ भी सामान्यत: समान हैं। इन समस्याओं को सुलझाने के लिए इन देशों ने 'दक्षिण एशिया क्षेत्रीय सहयोग संगठन' (सार्क) की स्थापना की है। इसकी रचना और क्रियान्वयन में भारत ने बहुत महत्वपूर्ण भूमिका निभाई है।

स्थिति और विस्तार :

भारत की स्थिति पूर्वी गोलार्ध के मध्य भाग में है यहाँ दिए गए मानचित्र में भारत का अक्षांश--देशांतरीय विस्तार दर्शाया गया है।

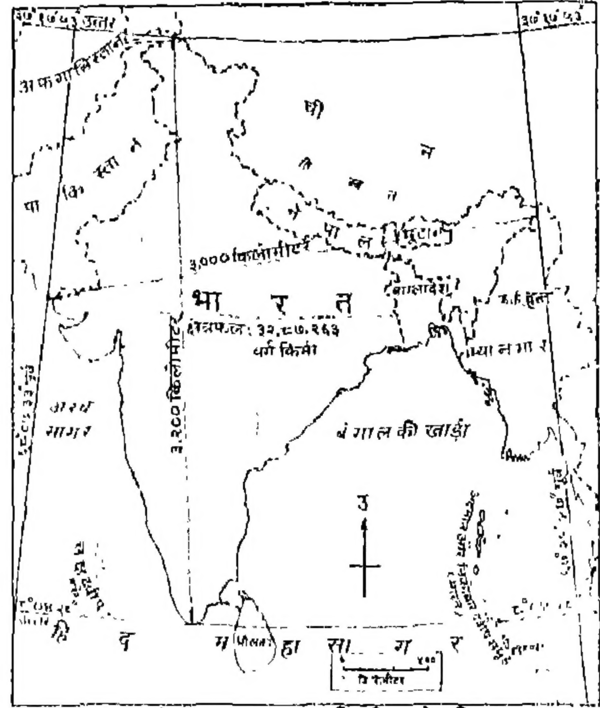
भारत उत्तरी गोलार्ध का देश है। इसका अक्षांशीय विस्तार ८° ४' २८" उत्तर से ३७° १७' ५३" उत्तर और देशांतरीय विस्तार ६८° ७' ३३" पूर्व से ९७°२४'४७" पूर्व के मध्य है। भारत के उत्तर-पश्चिम में पाकिस्तान, अफगानिस्तान, उत्तर में चीन, नेपाल, भूटान तथा पूर्व में म्यानमार देश हैं। पूर्व में बांग्लादेश तथा उत्तर में भूटान और नेपाल की सीमाएँ तीन ओर से



आकृति १.२ भारत की स्थिति

भारतीय भूप्रदेश से लगी हुई हैं। भारत के पूर्व में बंगाल की खाड़ी, पश्चिम में अरब सागर और दक्षिण में हिंद महासागर है। इसी भाग में पाल्क जलसंयोजक (जलडमरूमध्य) दवारा भारत और श्रीलंका अलग हुए हैं।

भारत का क्षेत्रफल ३२,८७,२६३ वर्ग किमी. है। क्षेत्रफल की, दृष्टि से संसार में भारत का सातवाँ स्थान है। संसार के संपूर्ण भूभाग का लगभग २.४% क्षेत्र भारत दवारा घिरा है। इसका दक्षिण से उत्तर अधिक-से-अधिक विस्तार३२००किमी. और पूर्व से पश्चिम ३००० किमी. है। भारत की भू-सीमा १५,२०० किमी. तथा दवीपों और मुख्य भूमि को मिलाकर समुद्री किनारे की लंबाई ७,५१७ किमी. है। भारत के मध्यभाग से कर्करेखा गई है। यह



आकृति १.३ : भारत : स्थिति और विस्तार

भूभाग अधिक विस्तृत होकर उत्तर में कश्मीर की ओर और दक्षिण में कन्याकुमारी की ओर सँकरा होता गया है।

राजनैतिक विभाग :

भारत गणतंत्रात्मक (संघात्मक) देश है। शासन की सुविधा और प्रदेशों के शीघ्र विकास की दृष्टि से इसे भिन्न-भिन्न राज्यों में विभाजित किया गया है। सामान्यत: एक प्रमुख भाषा और उसकी उपभाषाएँ (बोलियाँ) बोलने वाले लोगों के प्रदेश की एक राज्य के रूप में भाषावार रचना की गई है। इसके अनुसार भारत में इस समय २८ राज्य और ७ केंद्रशासित प्रदेश हैं। ये राज्य और केंद्रशासित क्षेत्र मानचित्र में दर्शाए गए हैं। हम भारत का भौगोलिक अध्ययन करते समय इन राज्यों के नामों का निरंतर उपयोग करने वाले हैं। उद्देश्य यह है कि भारत में इनकी स्थिति, विस्तार (क्षेत्रफल), आकार आदि की जानकारी होना अत्यावश्यक है।

विविधता में एकता :

भारत की भौगोलिक परिस्थिति में, इसके विशाल विस्तार के कारण विविधता मिलती है। उत्तर की पर्वत श्रेणियों के दक्षिण में पहाड़ी, मैदानी और पठारी क्षेत्र हैं। इन क्षेत्रों में बारह महीने तथा अल्पकाल प्रवाहित, कम या अधिक जलवाली मंद या तीव्र गति से बहने वाली नदियाँ हैं। इस प्रकार यहाँ की नदियों की प्रकृति में भी विविधता मिलती है।

एशिया महाद्वीप के मध्य में हिमालय तथा अन्य पर्वत श्रेणियों की स्थिति, विस्तार तथा दक्षिण में हिंद महासागर की भौगोलिक विशेषता के कारण भारत में मानसूनी जलवायु पाई जाती है। ऋतुओं के अनुसार हवा और वर्षा में परिवर्तन मानसूनी जलवायु की विशेषता है। भारत में तापमान का असमान वितरण होने पर भी जलवायु सामान्यत: उष्ण है। इसी प्रकार वर्षा का वितरण

असमान होने से जलवायु में विविध उपप्रकार दिखाई पड़ते हैं । तापमान, वर्षा की मात्रा और वितरण के अनुसार वनस्पति के प्रकार मिलते हैं । मृदानिर्माण तथा उसकी विशेषताओं पर भी जलवायु का प्रभाव दीख पड़ता है । प्राणियों के प्रकार तथा उनकी संख्या में वनस्पति की सघनता व प्रकारानुसार परिवर्तन होता है। मृदा और वर्षा पर कृषि निर्भर है । इसीलिए फसलों में भी विविधता पाई जाती है । अधिक पानी की आवश्यकता वाली तथा कम पानी में होने वाली विविध प्रकार की फसलें भारत में होती हैं । भारत में प्राकृतिक साधन संपत्ति के वितरण में भी भिन्नता मिलती है । चट्टानों के प्रकारों पर खनिजों की प्राप्ति निर्भर है । यही कारण है कि भारत के कुछ राज्य विविध प्रकार की खनिज संपत्ति से समृद्ध हैं तो कुछ राज्यों में खनिजों का अभाव है । छोटा नागपुर के पठार पर खनिज आधारित उद्योग-धंधों का केंद्रीकरण हुआ दीखता है तो पश्चिम तथा दक्षिण भारत में कृषि संबंधी उद्योगों का विकास अधिक मिलता है ।

प्राकृतिक रचना, जलवायु, प्राकृतिक साधन-संपत्ति की उपलब्धि, उद्योग-धंधों के स्वरूप आदि का प्रभाव यातायात मार्गों के वितरण पर स्पष्ट दिखता है । उत्तर भारत के मैदानी क्षेत्रों में यातायात-मार्गों का घना जाल बिछा है, तो पहाड़ी, मरुस्थली आदि क्षेत्रों में यातायात मार्ग विरल हैं ।

भौगोलिक विविधता का प्रभाव मानव जीवन में भी प्रतिबिंबित दीखता है । वर्तमान स्थिति में पहनावे पर आधुनिकता का प्रभाव सर्वत्र होने पर भी कश्मीरी, राजस्थानी, पंजाबी, बंगाली और दक्षिणी पहनावों ने अपनी-अपनी विशेषताएँ टिका रखी हैं । अधिकांश भारतीय स्त्रियाँ साड़ी पहनती हैं । देश के लोग विविध धर्मावलंबी, विविध भाषा-भाषी तथा विविध रीति-व्यवहार और परंपराओं के मानने वाले हैं; तथापि सभी भारतीय हैं । क्षेत्रीय भौगोलिक रचना कैसी ही क्यों न हो, समान सांस्कृतिक विरासत ने सबको एकसूत्र में बाँध रखा है । गंगा के उपजाऊ मैदानों में सहस्रों वर्ष ज्ञान की उपासना तथा सांस्कृतिक मूल्यों का विकास हुआ । लोगों के स्थानांतरण के साथ-साथ इन सांस्कृतिक मूल्यों का प्रसार भारत के अन्य भागों में हुआ । यही कारण है कि हमारे मौलिक एवं शाश्वत जीवनमूल्य और परंपराएँ आज भी टिकी हैं । विदेशी आक्रमणकारियों ने समय-समय पर आघात किए, फिर भी सांस्कृतिक बंधनों के कारण देश की एकता टिकी रही है ।

सहनशीलता, परस्पर प्रेम, सर्वधर्मसमभाव, अहिंसा, राष्ट्रभक्ति जैसी सांस्कृतिक देन से प्राप्त विशेषताओं के कारण भारत में विविध धर्मावलंबी, विविध भाषा-भाषी और विविध व्यवसाय करने वाले लोग सामंजस्य के साथ रहते हैं । विविध धर्मों के संतों ने अपने कार्यों और उपदेशों से इस देश में समानता का बीज बोया । विविध भाषा-भाषियों ने अपने काव्य–साहित्य में आसेतु हिमालय भारत का वर्णन किया । इसी से "हम सब एक हैं" की भावना आज तक बद्धमूल है ।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :
   - क. दक्षिण एशिया में .... संगठन स्थापित हुआ है ।
   - ख. भारतीय उपमहाद्वीप के लोगों का जीवन प्रमुखत: .... व्यवसाय पर निर्भर है ।
   - ग. भारत और श्रीलंका को .... जलसंयोजक ने विलग किया है ।

२. उचित जोड़ियाँ लगाओ :

'क' समूह (राज्य)	'ख' समूह (राजधानी)
च. अरुणाचल	१. तिरुवनंतपुरम
छ. मणिपुर	२. दिसपुर
ज. केरल	३. बंगलूरु
झ. कर्नाटक	४. इंफाल
	५ . इटानगर

३. निम्नांकित प्रश्नों के एक-एक वाक्य में उत्तर लिखो :
   - ट. भारत के दक्षिण में कौन-सा सागर है ?
   - ठ. नेपाल और भूटान के बीच कौन-सा राज्य है?
   - ड. क्षेत्रफल की दृष्टि से संसार में भारत का कौन सा-स्थान है ?
   - ढ. किन देशों की तीन ओर की सीमाएँ भारत से मिलती हैं ?
   - ण. किस पठार पर उद्योग-धंधों का केंद्रीकरण हुआ है ?

४. कारण लिखो :
   - त. भारतीय उपमहाद्वीप में वैशिष्ट्यपूर्ण संस्कृति का उद्भाव हुआ ।
   - थ. भारतीय उपमहाद्वीप में मानसूनी जलवायु पाई जाती है ।
   - द. भारत की विविधता में भी एकता मिलती है ।

५. टिप्पणियाँ लिखो :
   - प. भारतीय उपमहाद्वीप
   - फ. भारत की सांस्कृतिक एकता

६. भारत की रेखाकृति में निम्नांकित को दर्शाकर यथावश्यक नाम लिखो :
   - १. कर्करेखा
   - २. उत्तरांचल
   - ३. महाराष्ट्र की राजधानी
   - ४. गोआ
   - ५. पांडिच्चेरि

(आ)

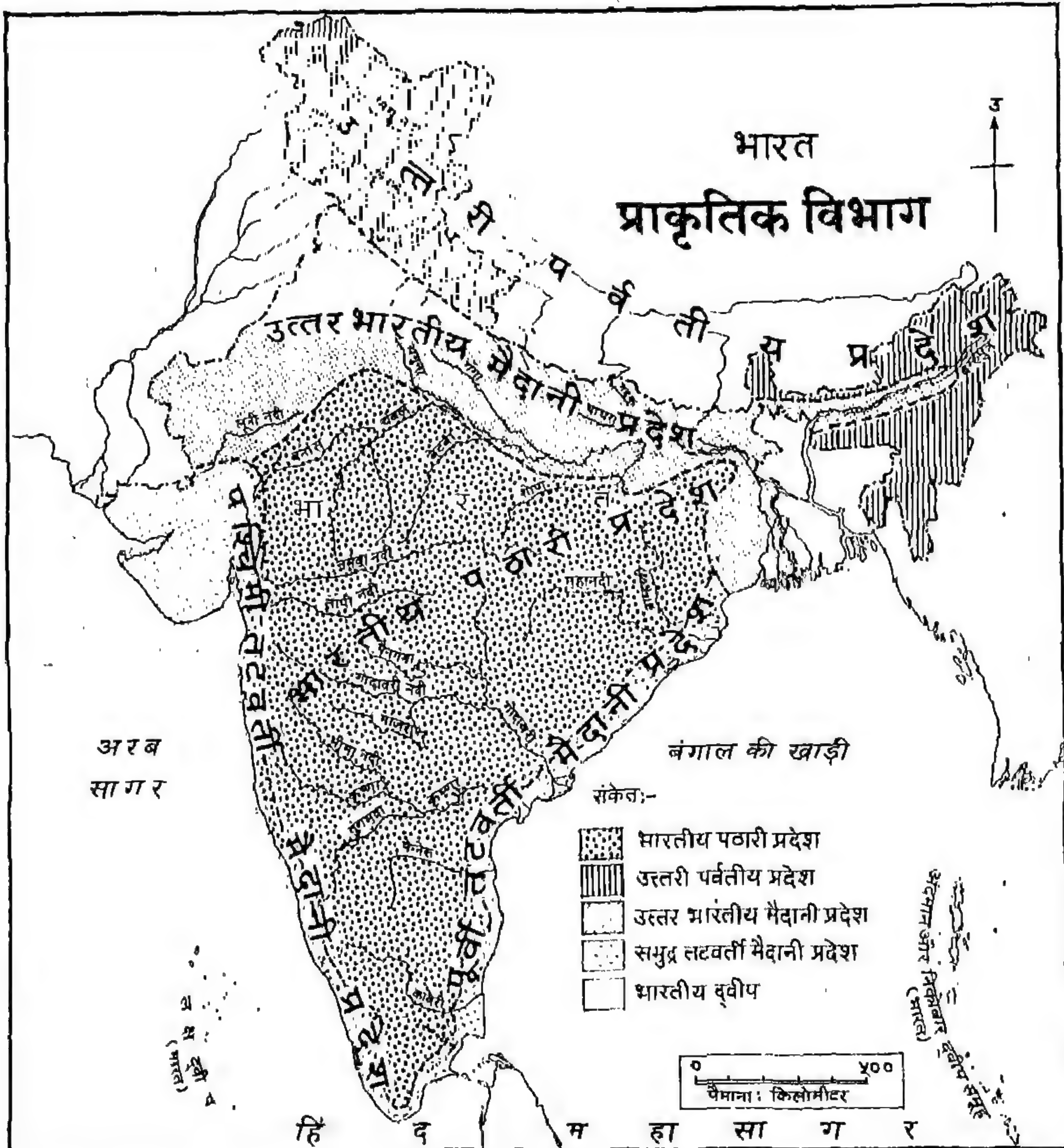
भारतीय लोगों के भोजन, वस्त्र, निवास और सांस्कृतिक विशेषताओं से संबंधित जानकारी और चित्र एकत्र करो ।

प्रकरण २

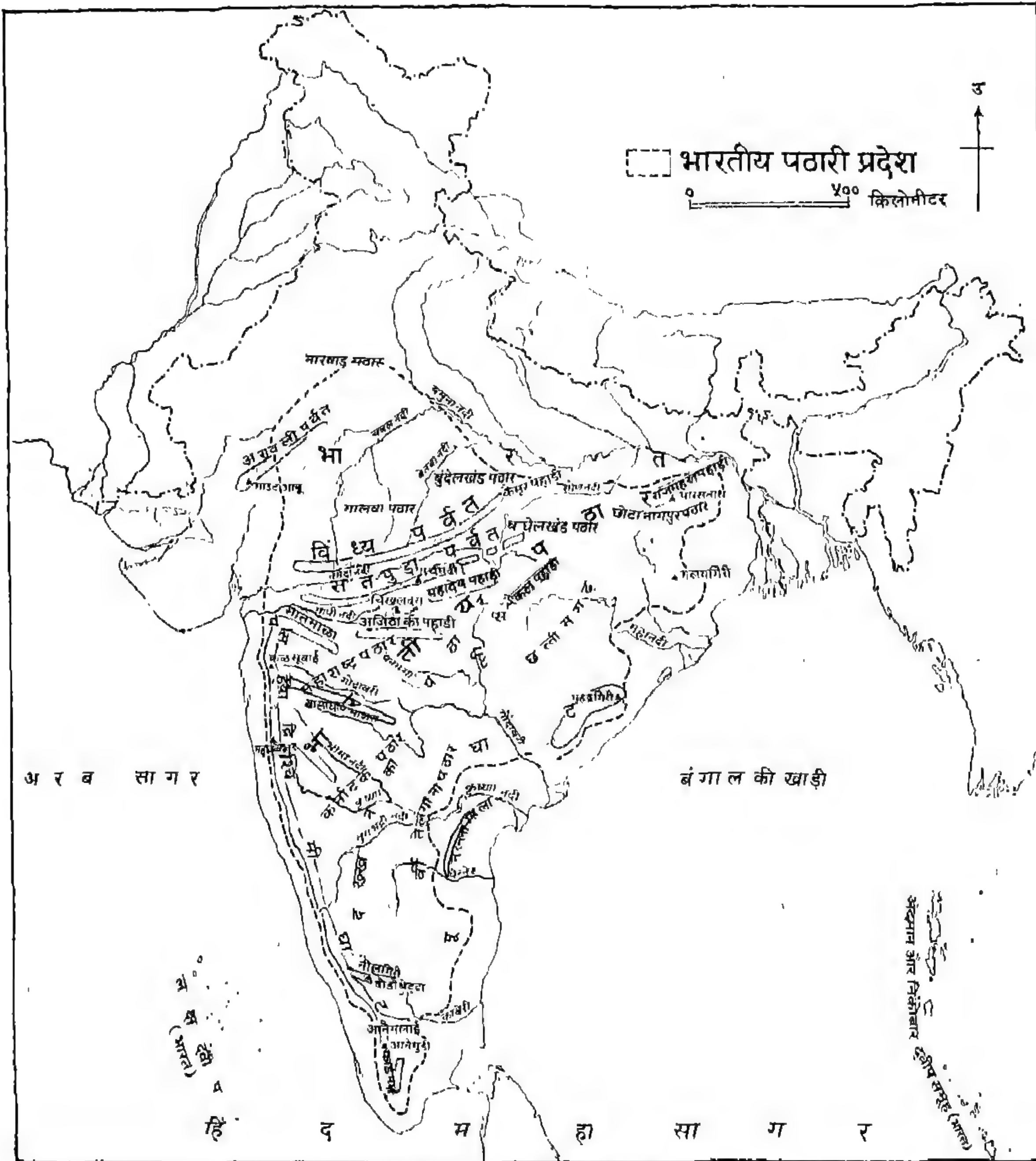
प्राकृतिक विभाग

प्राकृतिक विभाग के अंतर्गत सामान्यतः किसी प्रदेश की एक समान निश्चित प्राकृतिक विशेषताएँ आती हैं। भारत की भू-रचना में प्राकृतिक दृष्टि से विविधता मिलती है। हिमालय की ऊँची श्रेणियों, दकन के प्राचीन पठार, गंगा के विस्तृत कछार आदि की प्रमुख विशेषताओं ने भारतीय भू-प्रदेश को एक निराला भौगोलिक स्वरूप प्रदान किया है। संसार में इतने ही क्षेत्रफल वाले किसी अन्य देश में ऊँचाई, ढलान, चट्टानों के प्रकार, उनकी संरचना आदि के संबंध में इतनी विविधता नहीं मिलती। इन विशेषताओं को ध्यान में रखकर रचनानुसार भारत के निम्नांकित प्राकृतिक विभाग किए जाते हैं....

१. भारतीय पठारी प्रदेश
२. उत्तरीय पर्वतीय प्रदेश
३. उत्तर भारतीय मैदानी प्रदेश
४. समुद्र तटवर्ती मैदानी प्रदेश
५. भारतीय द्वीप



आकृति २.१ : भारत के प्राकृतिक विभाग



आकृति २.२ : भारतीय पठारी प्रदेश

१. भारतीय पठारी प्रदेश :

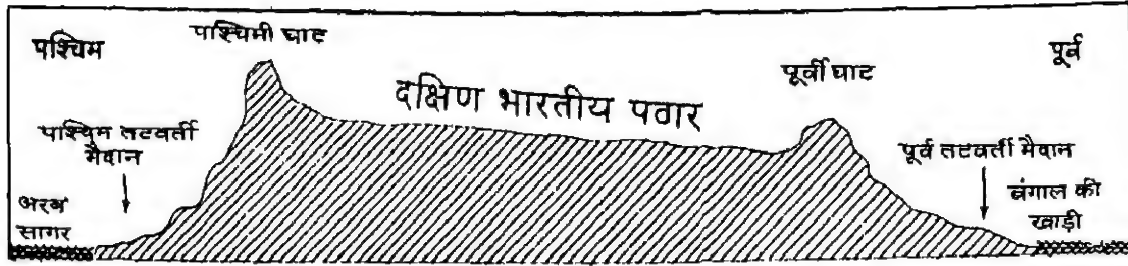
भारत का अत्यंत प्राचीन और स्थिर माना जाने वाला त्रिभुजाकार दक्षिणी भाग भारतीय पठार है। इस पठार के उत्तर - पश्चिम में अरावली पर्वत, उत्तर-पूर्व में राजमहल की पहाड़ियाँ और दक्षिण में नीलगिरी पर्वत की श्रेणियाँ हैं। इसी प्रकार पूर्व में पूर्वीघाट विखंडित पहाड़ियों की श्रेणी तथा पश्चिम में उत्तर से दक्षिण फैली पश्चिमी घाट की पहाड़ियाँ हैं। इस पठार की औसत ऊँचाई ३०० से ९०० मीटर तक है। नर्मदा नदी की भ्रंशघाटी द्वारा भारतीय पठार के उत्तरी तथा दक्षिणी भारतीय पठार, ये दो विभाग हो जाते हैं।

उत्तर भारतीय पठार :

नदियों के कछारों तथा पहाड़ी श्रेणियों के कारण यह पठार विभाजित होकर पश्चिम से पूर्व की ओर क्रमशः मालवा, बुंदेलखंड, बघेलखंड और छोटा नागपुर का पठार कहलाता है। उत्तर भारतीय पठार पश्चिम में अरावली पर्वत से पूर्व में राजमहल की पहाडियों तक फैला है। इसके दक्षिण मे विंध्य और मैकल पर्वतों की श्रेणियाँ हैं। इन पर्वत श्रेणियों से उद्गमित चंबल, बेतवा नदियाँ यमुना से, तो सोन नदी गंगा से मिलती है। संसार के वलित (मोड़दार) पर्वतों में से एक, जो अब अवशिष्ट पर्वत के रूप में जाना जाता है, वह अरावली पर्वत, इस उपविभाग की एक विशेषता है। इस पर्वत पर माउंट आबू ठंडी जलवायु का स्थल है और गुरुशिखर (१,७२२ मीटर) इसकी सबसे ऊँची चोटी है।

उत्तरी और दक्षिणी भारतीय पठारों के मध्य उत्तर की ओर से पहले विंध्य-श्रेणियाँ और बाद में नर्मदा ताप्ती नदियों के कछार हैं। विंध्य पर्वत की श्रेणियाँ पूर्व-पश्चिम फैली हुई हैं। इनकी औसत ऊँचाई १३०० मीटर है। इन पर्वतों की उत्तरी ढलान मंद और दक्षिणी ढलान तीव्र है। इन पर्वतों में प्रमुखतः बालुकाश्म मिलते हैं।

... दक्षिण की ओर पहले नर्मदा नदी की घाटी,



आकृति २.३ : दक्षिणी भारतीय पठार का पूर्वी और पश्चिमी विभाग

फिर सतपुड़ा पर्वत और अंत में तापी की घाटी है। भारतीय पठार की नर्मदा और तापी, दोनों नदियाँ, पूर्व से पश्चिम की ओर बहती हैं। इन नदियों के मध्य स्थित सतपुड़ा पर्वत की श्रेणियों में **धूपगढ़** (१,३५० मीटर) ऊँचा शिखर है। **पंचमढ़ी** और **तोरणमाळ** ठंडी जलवायु के स्थल हैं।

दक्षिण भारतीय पठार :

इस पठार को दकन का पठार भी कहते हैं। प्रादेशिक स्थिति और विशेषताओं के आधार पर इसके महाराष्ट्र पठार, कर्नाटक पठार और तेलंगना पठार के नाम से उपविभाग किए जाते हैं।

महाराष्ट्र पठार :

यह बेसाल्ट चट्टानों से बना है। इसके पश्चिम में अरब सागर के तट के लगभग समानांतर सह्याद्रि की श्रेणियाँ उत्तर-दक्षिण फैली हैं। सह्याद्रि से पूर्व की ओर सातमाळा, अजंता, हरिश्चंद्र, बालाघाट, महादेव आदि पहाड़ी श्रेणियाँ महाराष्ट्र पठार पर फैली हैं। पूर्व की ओर इनकी ऊँचाई कम होती गई है। इन पहाड़ी श्रेणियों के मध्य गोदावरी, भीमा और कृष्णा आदि प्रमुख नदियों के कछार हैं।

कर्नाटक पठार :

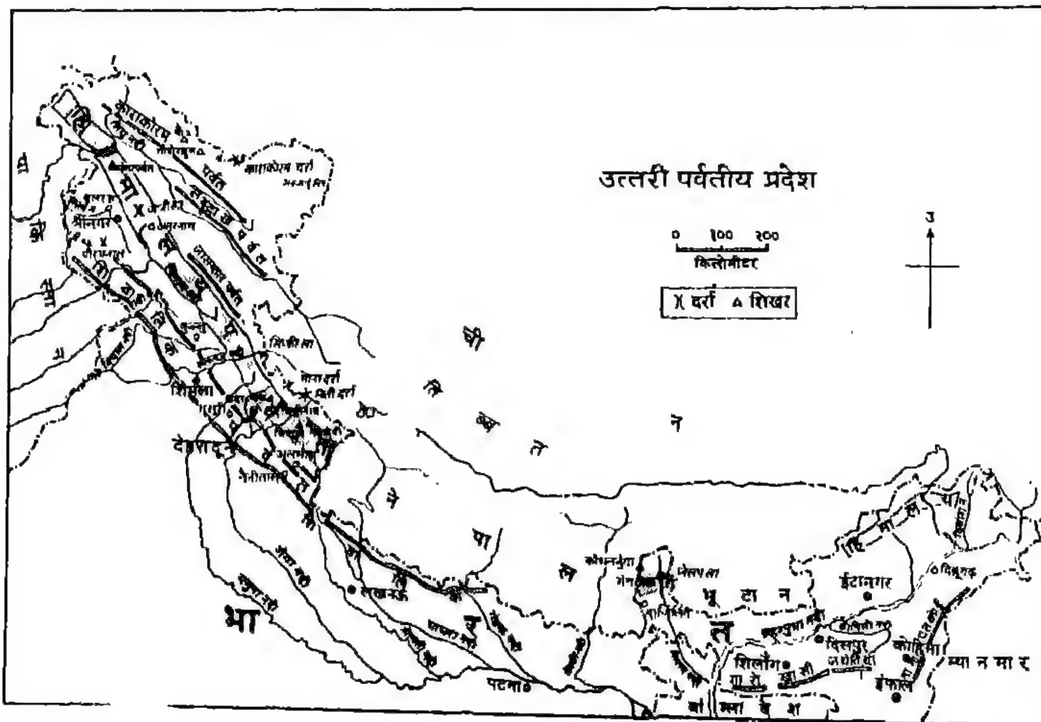
यह पश्चिम में पश्चिमीघाट, पूर्व में पूर्वीघाट, दक्षिण में नीलगिरी पर्वत और उत्तर में महाराष्ट्र पठार से घिरा मध्य में है। यह पठार अति प्राचीन अग्निजन्य तथा रूपांतरित चट्टानों से बना है। इस पठार की ऊँचाई दक्षिण की ओर बढ़ती जाती है। कृष्णा, तुंगभद्रा, कावेरी आदि प्रमुख नदियाँ इस पठार से होकर बहती हैं।

तेलंगाना पठार :

तेलंगाना पठार प्रमुखतः आंध्र प्रदेश में है। यह भी अति प्राचीन अग्निजन्य चट्टानों से बना है। इसका उत्तरी भाग पहाड़ी है। इसके दक्षिणी भाग में ग्रेनाईट की अछिद्र चट्टानों तथा भू-पृष्ठ की ऊँचाई-निचाई के कारण तालाबों का निर्माण अधिक संख्या में हुआ है।

पश्चिमी घाट : यह दक्षिण भारतीय पठार की पश्चिमी सीमा है। साथ ही यह तापी के कछार से सीधे दक्षिण में कन्याकुमारी तक फैला है। इस घाट की पश्चिमी बाजू तीव्र खड़ी ढलान और पूर्वी बाजू मंद ढलान की है। इस पर्वत की औसत ऊँचाई १२०० मीटर है। बंगाल की खाड़ी और अरब सागर में मिलने वाली नदियों का पश्चिमी घाट प्रमुख जलविभाजक है।

दक्षिण में **पूर्वीघाट** और पश्चिमीघाट, नीलगिरि पर्वत में मिल गए हैं। **दोदाबेट्टा** (२६२७ मीटर) और **माकुर्णी** (२५९४ मीटर) नीलगिरि के ऊँचे शिखर पर हैं। दोदाबेट्टा की तलहटी में **उदकमंडलम** ठंडी जलवायु का स्थल है। इनके पश्चात अनेमलाई



आकृति २.४ : उत्तरी पर्वतीय प्रदेश

पर्वत श्रेणियाँ तथा बिल्कुल दक्षिण में कार्डमम श्रेणियाँ हैं। नीलगिरी के दक्षिण में पालघाट दर्रा है। दक्षिण भारत में अनैमलाई पर्वत श्रेणियों में आनैमुडी २६९५ मीटर ऊँचाई का सर्वाधिक उच्च शिखर है।

पूर्वीघाट, नदियों के छीजन के कारण खंडित श्रेणियों से बना है। महानदी और गोदावरी के मध्य फैले पर्वत को **महेंद्रगिरि** तथा कृष्णा और पैन्नेरु नदियों के बीच फैली पहाड़ी को **नल्लामाला** पहाड़ी कहते हैं। कम ऊँचाई की अलग-अलग खंडों में फैली पहाड़ियाँ पूर्वीघाट के प्रमुख भूस्वरूप हैं।

२. उत्तरी पर्वतीय प्रदेश :

भारत की उत्तरी सीमा पर संसार के सबसे ऊँचे पर्वत हिमालय की श्रेणियाँ हैं। पाकिस्तान की पूर्वी सीमा से म्यानमार की पश्चिमी सीमा तक उत्तर में पर्वतीय प्रदेश फैला है। हिमालय पर्वत की श्रेणियाँ लगभग २५०० किमी लंबी हैं और उनकी चौड़ाई १५० से ४०० किमी तक है। हिमालय अर्वाचीन मोड़दार पर्वत है।

आज जहाँ हिमालय पर्वतीय प्रदेश है, वहाँ लगभग ६० करोड़ वर्ष पहले 'टेथिस' नामक समुद्र था। इस समुद्र के उत्तर में अंगारालैंड या लॉरेशिया और दक्षिण में गोंडवानालैंड नामक दो भूखंड थे। इन दोनों भूखंडों से बहकर आने वाली नदियों ने बहुत अधिक मात्रा में काँप का निक्षेपण इस समुद्र में किया। कालांतर में पृथ्वी के क्षैतिजिक हलचलों के दबाव के कारण काँप-निर्मित सतहें ऊँची उठीं और उनमें अनेक मोड़ पड़ गए, जिनके कारण धीरे-धीरे हिमालय का निर्माण हुआ।

हिमालय की पर्वत श्रेणियाँ :

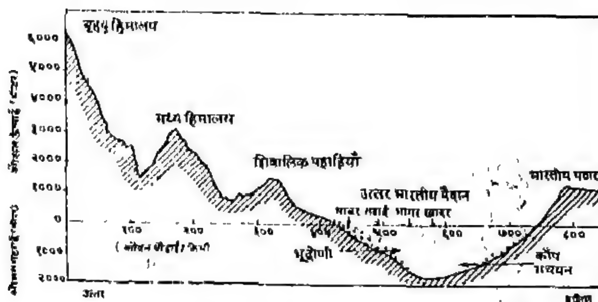
सामान्यत: दक्षिण से उत्तर की ओर अर्थात भारत से तिब्बत की ओर हिमालय की तीन श्रेणियाँ पूर्व-पश्चिम में फैली हैं। ये श्रेणियाँ परस्पर समानांतर हैं।

शिवालिक पहाड़ियाँ :

पाकिस्तान में पोतवार पठार से ब्रह्मपुत्र नदी के कछार तक हिमालय की तलहटी में फैली पहाड़ियों को शिवालिक पहाड़ियाँ कहा जाता है। इनकी ऊँचाई १,००० से १,५०० मीटर और चौड़ाई १५ से २० किमी है।

मध्य हिमालय :

शिवालिक पहाड़ियों से लगी हुई उत्तर में मध्य हिमालय की श्रेणियाँ हैं। इनकी औसत ऊँचाई ३००० मीटर और चौड़ाई



आकृति २.५ : हिमालय से भारतीय पठार तक का छेद

लगभग ६० से ८० किमी है। मध्य हिमालय की दक्षिणी ढलान पर शिमला, मसूरी, नैनीताल, दार्जिलिंग आदि ठंडी जलवायु के स्थल हैं।

बृहद् हिमालय :

हिमालय के एकदम उत्तर की पर्वत श्रेणियों को बृहद् हिमालय कहते हैं। इन श्रेणियों की औसत ऊँचाई ६,००० मीटर और चौड़ाई १२० से २०० किमी. तक मिलती है।

संपूर्ण क्षेत्र में ऊँची हिमाच्छादित चोटियाँ, तीव्र ढलान वाली पहाड़ियाँ और पर्वत श्रेणियाँ, गहरी घाटियाँ और उनमें से होकर कल-कल करती तीव्र वेग से बहने वाली नदियाँ आदि यहाँ की विशेषताएँ हैं।

हिमालय पर्वत प्रदेश की अधिक जानकारी, इसके पश्चिम और पूर्व विभाग करके समझी जाती है। इन विभागों को क्षेत्रीय नाम दिए गए हैं। कश्मीर हिमालय, पंजाब हिमालय, कुमाऊँ हिमालय, नेपाल हिमालय तथा पूर्व हिमालय जैसे नाम से ये विभाग पहचाने जाते हैं।

कश्मीर हिमालय में दक्षिण से उत्तर की ओर क्रमश: शिवालिक पहाड़ियाँ, पीरपंजाल, झास्कर, लद्दाख,काराकोरम आदि पर्वत श्रेणियाँ परस्पर समानांतर फैली हैं। भारत में के - २ शिखर सबसे ऊँचा और संसार में दूसरे क्रमांक का ऊँचा शिखर है। इस शिखर की ऊँचाई ८६११ मीटर है।

पंजाब हिमालय सतलज नदी के उत्तर-पश्चिम में फैला है। उत्तरांचल के कुमाऊँ भाग में फैले हिमालय को कुमाऊँ हिमालय नाम दिया गया है। गंगा, यमुना आदि प्रमुख नदियों का उद्‌गम स्थान कुमाऊँ हिमालय ही है। इस क्षेत्र में ७,८१७ मी. ऊँची नंदादेवी सबसे ऊँची चोटी है। कुमाऊँ हिमालय के पूर्व में **नेपाल हिमालय** है। सिक्किम से पूर्व में ब्रह्मपुत्र नदी तक **पूर्व हिमालय** है। इसकी श्रेणियाँ सिक्किम, पश्चिम बंगाल, अरुणाचल प्रदेश, असम आदि राज्यों में फैली हैं। अति घने वनों और गहरी खाइयों के कारण यह क्षेत्र बड़ा दुर्गम है। पूर्व हिमालय की एक श्रेणी दक्षिण की ओर मुड़ती है। यह अनेक पहाड़ियों के रूप में मेघालय, नागालैंड, मणिपुर, त्रिपुरा, मिजोराम आदि पूर्वी राज्यों में फैली मिलती है। इन अति दुर्गम पहाड़ियों के प्रदेश को **'पूर्वांचल'** नाम दिया गया है। इन पहाड़ियों में पटकोई, नागा, गारो, खासी, जयंतिया आदि प्रमुख हैं।

३. उत्तर भारतीय मैदानी प्रदेश :

निर्माण की दृष्टि से भारतीय पठार प्रथम, उसके बाद हिमालय पर्वत और अंत में भारतीय मैदान का क्रम है। भारतीय पठार और हिमालय के मध्य भारतीय मैदान का स्वरूप उभरा है। यह मैदान राजस्थान से असम तक फैला है।

हिमालय पर्वत के निर्माण-युग में इसके दक्षिण में निर्मित भू-द्रोणी में हिमालय तथा भारतीय पठार से बहकर आने वाली नदियों ने प्रचुर मात्रा में काँप का संचयन किया। इससे उत्तर भारतीय मैदान का निर्माण हुआ। इस मैदान में लगभग ५०० से ४००० मीटर गहराई तक काँप का संचयन हुआ मिलता है। एक अत्यंत समतल मैदान के रूप में उत्तर भारतीय मैदान प्रसिद्ध है।

हिमालय की तलहाटी में नदियों ने कंकड़, पत्थर, बालू आदि का संचयन करके मैदान तैयार किया है। इसे भाबर कहते हैं। भाबर के दक्षिण में बारीक मलवे के निक्षेपण से बना तराई का मैदान है। इसके भी दक्षिण में विशेष मंद ढलान वाले पुराने काँप के मैदान को भांगर तथा नए काँप के क्षेत्र को खादर कहते हैं।

उत्तर भारतीय मैदान के, पश्चिमी मैदान, मध्य मैदान और पूर्वी मैदान, ये तीन विभाग किए जाते है।

पश्चिमी मैदान :

इस मैदान का दक्षिणी भाग शुष्क, मरुस्थली और उत्तरी भाग उपजाऊ काँप निर्मित है। अरावली पर्वत के पश्चिम वाले क्षेत्र पर प्राचीन युग के समुद्री काँप-निक्षेपण के बाद हिम-क्षरण का प्रभाव पड़ा। इस समय इस क्षेत्र में शुष्क और मरुस्थली मैदान है। इसे 'भारतीय महामरुस्थल' कहते हैं। देश में इसकी स्थिति पश्चिम में होने के कारण तथा भाँपभरी हवाओं को रोकने वाली पर्वत श्रेणियों के अभाव से यहाँ वर्षा अत्यल्प होती है। प्राचीनकाल में यहाँ विरल वनस्पतियों का आवरण था। मानव बस्ती बसने के बाद खेती पशु-चरागाह के कारण वनस्पति-आवरण कम होता चला गया। बाद में हवा के प्रभावशाली कार्यों के कारण यह क्षेत्र मरुस्थल बना होगा।

मात्र उत्तर प्रदेश में पड़ने वाला क्षेत्र सिंधु और उसकी सहायक नदियों के निक्षेपण से उपजाऊ काँप का बना है। पंजाब, हरियाणा राज्य इसी मैदान में है।

मध्य मैदान :

गंगा, यमुना और इनकी सहायक नदियों के निक्षेपण से उत्तर प्रदेश राज्य में उपजाऊ काँप का बना समतल मैदान है।

पूर्वी मैदान :

बिहार एवं पश्चिम बंगाल में गंगा का डेल्टा क्षेत्र तथा असम में ब्रह्मपुत्र के मैदान का समावेश पूर्वी मैदान में होता है। गंगा के मुख के समीप का क्षेत्र, अत्यंत समतल है। नदियाँ मंद गति से बहती हैं। यहाँ अधिक मात्रा में काँप का निक्षेपण होता है, जिससे पानी बहकर निकल जाने में रुकावट पैदा होती है। निक्षेपित काँप द्वारा रुकावट पैदा होने से मुख्यधारा की अनेक उपधाराएँ बन जाती हैं, जिनके द्वारा गंगा का पानी समुद्र में मिलता है और त्रिभुज प्रदेश का निर्माण होता है।

४. समुद्र तटवर्ती मैदानी प्रदेश :

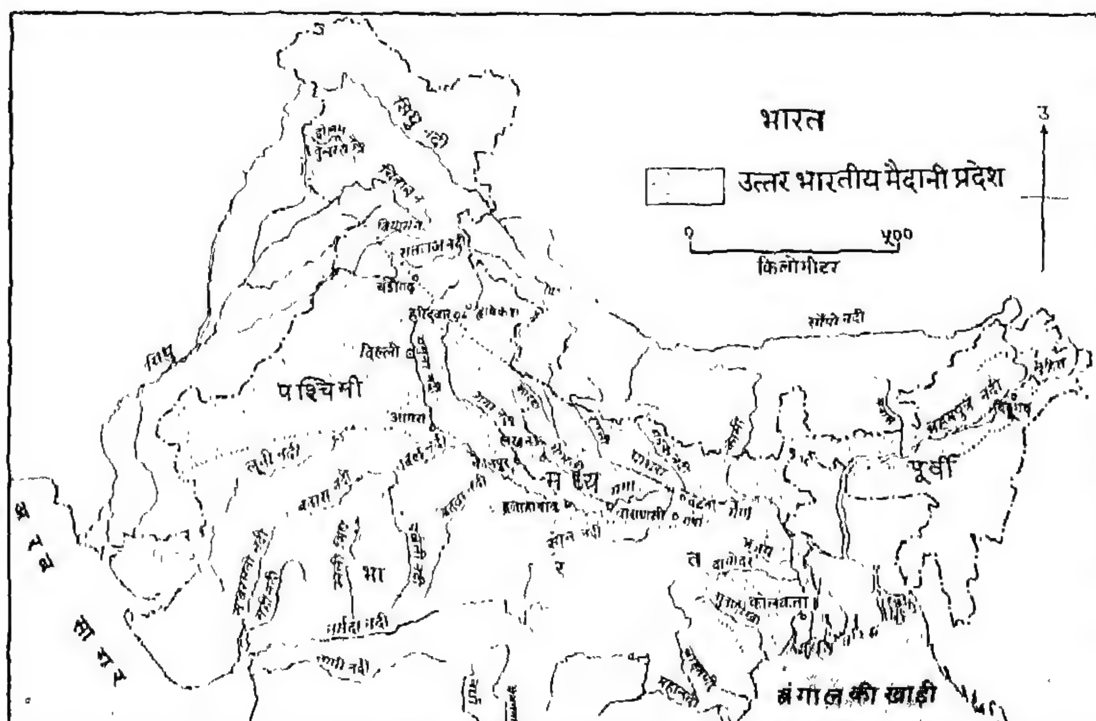
भारतीय पठार के पूर्व और पश्चिम में सँकरे तथा विशेषताओं से पूर्ण समुद्र तटवर्ती मैदान हैं।

पूर्वी तटवर्ती मैदान : उत्तर में सुवर्णरेखा नदी के कछार से दक्षिण में कन्याकुमारी तक फैला है। इसमें उड़ीसा, आंध्र प्रदेश और तमिलनाडु राज्यों के तटवर्ती भागों का समावेश होता है। पूर्व तटवर्ती मैदान पश्चिम तटवर्ती मैदान की अपेक्षा अधिक चौड़ा और विस्तृत है, साथ ही यह अधिक समतल भी है। इस मैदान में महानदी, गोदावरी, कृष्णा, कावेरी आदि नदियों के डेल्टा प्रदेश हैं। इस तट के समीप समुद्र उथला है। इसलिए यहाँ रेत के टीले और पुलिन देखने को मिलते हैं। इस क्षेत्र में चिल्का, कोलेरू, पुलिकत आदि झीलें हैं।

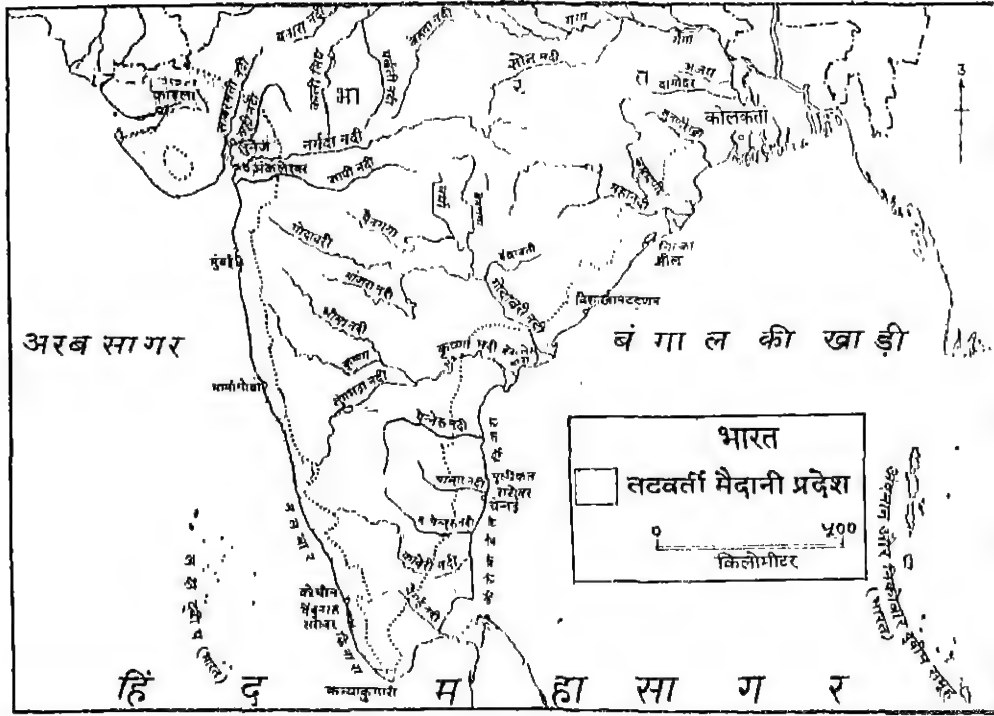
पश्चिम तटवर्ती मैदान कच्छ के रन से कन्याकुमारी तक फैला है। यह सँकरा है। पूर्वी तट की तुलना में पश्चिमी तट कुछ कटावदार है और यहाँ समुद्र गहरा है। पश्चिम में तीव्र ढलान वाला पश्चिमीघाट तट के लगभग समानांतर है। इस घाट से तीव्र गति वाली छोटी-छोटी अनेक नदियाँ इस मैदान को जगह-जगह खंडित करती हैं। गुजरात, महाराष्ट्र, गोआ, कर्नाटक और केरल राज्यों के, अरब सागर से लगे हुए प्रदेश इस मैदान में आते हैं।

५. भारतीय द्वीप :

देश की मुख्य भूमि से अलग-थलग होते हुए भी द्वीप देश की प्राकृतिक रचना के ही एक अंग हैं। चारों ओर जल से घिरे होने के कारण द्वीपों को एक निराला ही प्राकृतिक स्वरुप प्राप्त होता है। इसलिए द्वीपों का अलग प्राकृतिक विभाग किया जाता है। समुद्र



आकृति २.६ उत्तरी भारतीय मैदानी प्रदेश

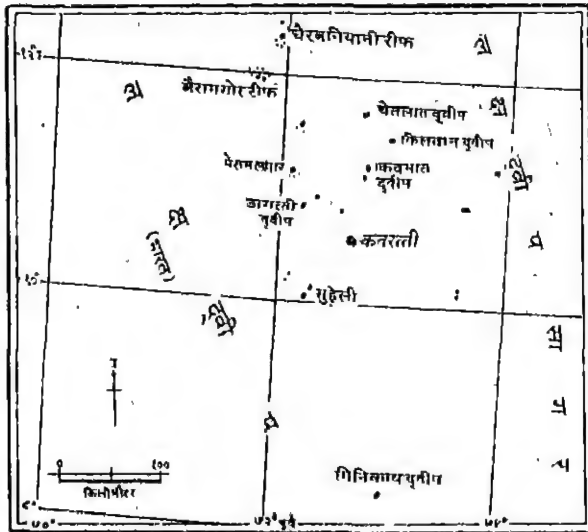


आकृति २.७ तटवर्ती मैदानी प्रदेश

में स्थिति के अनुसार भारतीय द्वीपों को, अरब सागर के द्वीप और बंगाल की खाड़ी के द्वीप के रूप में विभाजित किया जाता है।

अरब सागर के द्वीप :

अरब सागर में ज्वालामुखी पर्वतों के शिखरों के चारों ओर मूँगों के संचयन से इन द्वीपों का निर्माण हुआ है । अत: इन्हें प्रवाल द्वीप (मूँगों के द्वीप) कहते हैं । अरब सागर के द्वीपों



आकृति २.८ अरब सागर के द्वीप

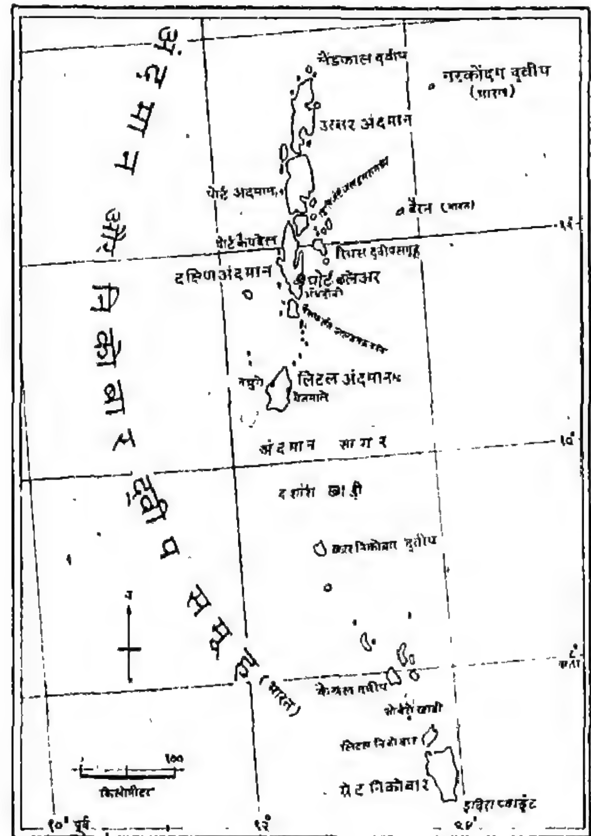
में लक्षद्वीप समूह प्रमुख है ।

बंगाल की खाड़ी के द्वीप :

बंगाल की खाड़ी में अंदमान और निकोबार प्रमुख द्वीप हैं । प्राकृतिक रचना की दृष्टि से ये द्वीप सागरमग्न पर्वत हैं । समुद्र सतह से इनकी अधिक ऊँचाई ७५० मी. हैं । बंगाल की खाड़ी के द्वीपों को अंदमान और निकोबार नाम से दो समूहों में विभाजित किया गया है ।

प्राकृतिक विभाग तथा उनके महत्व :

प्रदेश की प्राकृतिक विशेषताओं का बहुत बड़ा प्रभाव वहाँ के लोगों के कार्य-व्यवहार पर पड़ता है । यही नहीं, बल्कि इन



आकृति २.९ बंगाल की खाड़ी के द्वीप

विशेषताओं के कारण ही प्रदेश के मानव जीवन को विशिष्ठ दिशा मिलती है। प्रदेश की प्राकृतिक विशेषताएँ अच्छी तरह से समझ में आ गईं, तो उनका मनुष्य के आर्थिक, सामाजिक और सांस्कृतिक क्रियाकलापों पर कैसा प्रभाव पड़ता है, यह भली-भाँति समझ में आता है।

भारत की जलवायु हिमालय पर्वत की देन है। उत्तर की ओर से आने वाली ठंडी हवाओं से भारत को मिला संरक्षण कृषि के लिए बहुत महत्वपूर्ण सिद्ध हुआ है। हिमालय से बहुत बड़ी मात्रा में मिली जल-संपत्ति, वन-संपत्ति और खनिज-संपत्ति ने भारत की प्रगति में महत्वपूर्ण भूमिका निभाई है। इसकी प्रतीति हमें आगामी विविध अध्यायों में होगी। पर्यटन के क्षेत्र में हिमालय प्रदेश का विशेष महत्व है।

उत्तर भारतीय मैदान में यातायात की सुगमता है। आर्थिक विकास में यह प्रदेश महत्व की भूमिका निभाता है। यातायात मार्गों के घने जाल होने से आर्थिक विकास शीघ्रता से होता है। लोगों में विचारों का आदान-प्रदान होता है। देश का लगभग ३३% भाग मैदानों से व्याप्त है, जिनमें देश की लगभग ४०% जनसंख्या निवास करती है।

भारतीय पठार, अपने खनिजों के कारण, देश की आर्थिक व्यवस्था में महत्वपूर्ण है। यहाँ अनुकूल भागों में कृषि व्यवसाय भी विकसित अवस्था में है। विविध प्रकार की मृदा, सिंचाई-व्यवस्था आदि के कारण फसलों की विविधता दीख पड़ती है।

भारत के समुद्र तटवर्ती क्षेत्र समुद्र यातायात के लिए तथा मसाले के पदार्थ, आम, कटहल, सुपारी, नारियल आदि उत्पादनों के लिए उपयुक्त हैं। किनारों पर मछली पकड़ने का व्यवसाय होता है। प्राकृतिक सौंदर्य के कारण तटवर्ती क्षेत्र पर्यटकों के आकर्षक स्थल बने हैं। इसके लिए गोआ, केरल और कोंकण के तट विशेष प्रसिद्ध हैं।

समुद्र के द्वीप भारत की समुद्री सीमा की रक्षा की दृष्टि से महत्व के काम करते हैं। श्रेष्ठ पड़ाव स्थल के रूप में द्वीपों का उपयोग नाविकदलों तथा मछली पकड़ने वालों के लिए होता है।

इस प्रकरण में पठित विविध प्राकृतिक विभागों की जानकारी का उपयोग हम भारत की आर्थिक स्थिति समझाने में करने वाले हैं। उस समय इनका महत्व अधिकाधिक स्पष्ट होगा।

स्वाध्याय

१. रिक्त स्थानों में उचित शब्द लिखो :

क. भारतीय पठार के .... के कारण दो विभाग हुए हैं।
ख. अरावली पर्वत में .... शिखर सबसे ऊँचा है।
ग. महाराष्ट्र पठार .... चट्टानों से बना है।
घ. नल्लामाला पहाड़ी श्रेणियाँ .... राज्य में हैं।
ङ. हिमालय की तलहटी में .... पहाड़ियाँ है।

२. उचित जोड़ियाँ लगाओ :

'क' समूह (पर्वत)	'ख' समूह (शिखर)
च. सह्याद्रि	१. आनैमुडी
छ. हिमालय	२. कळसूबाई
ज. पूर्वीघाट	३. धूपगढ़
झ. सतपुड़ा	४. महेंद्रगिरि
	५. के-२

३. एक-एक वाक्य में उत्तर लिखो :

ट. भारतीय पठार के दो विभाग किस नदी के कारण हुए हैं ?
ठ. किन पठारों पर तालाबों की संख्या अधिक हैं ?
ड. दोदाबेट्टा की तलहटी में स्थित ठंडी जलवायु का स्थान कौन-सा है ?
ण. किस पठार का निर्माण ज्वालामुखी के उद्गार से हुआ है ?
त. भारत के पश्चिमी भाग में स्थित मरुस्थल का नाम लिखो।

४. कारण लिखो :

प. पूर्वीघाट खंडित श्रेणियों से बना है।
फ. गंगा के मुहाने पर डेल्टा का निर्माण हुआ है।

५. तुलना करो :

य. उत्तर भारतीय पठार और दक्षिण भारतीय पठार।
र. पश्चिमीघाट और पूर्वीघाट।

* * *

प्रकरण ३

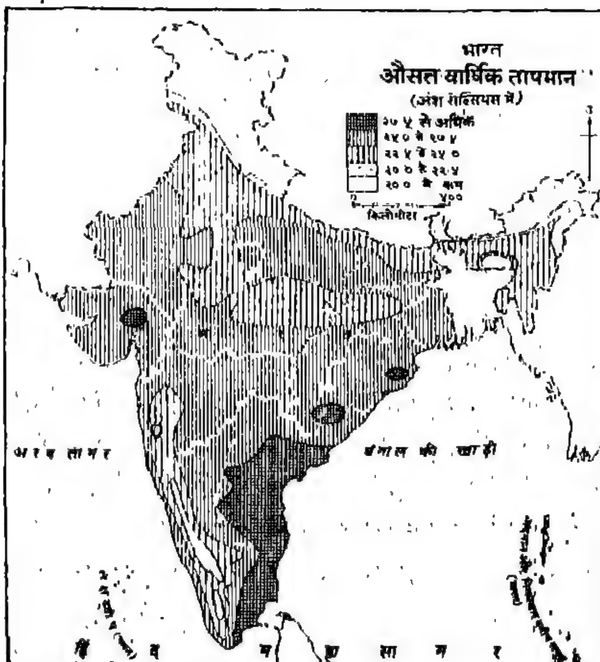
जलवायु

भारत की जलवायु मानसूनी है। दक्षिण तथा दक्षिण - पूर्व एशिया में पाई जाने वाली यह जलवायु विशेषताओं से परिपूर्ण है। मानसूनी प्रकार की जलवायु का निर्माण यहाँ के भू-भाग के विस्तार, उस पर पर्वत श्रेणियों की स्थिति, देश के मध्य से जाने वाले कर्कवृत्त, दक्षिण में विशाल हिंद महासागर आदि घटकों का तापमान-वितरण पर हुए प्रभाव के परिणाम स्वरूप होता है।

तापमान-वितरण :

इसके पूर्व प्रकरण में हमने भूभाग की स्थिति और पर्वत श्रेणियों के कारण भारतीय उपमहाद्‍वीप, शेष एशिया महाद्‍वीप से किस प्रकार अलग-थलग हुआ है, इसे भी हमने समझ लिया है। उत्तर की अति शीत हवाओं का प्रभाव, हिमालय पर्वत श्रेणियों के कारण कम हुआ है। इससे देश के तापमान की वृद्‍धि में सहायता मिली है। उसी प्रकार देश के मध्य से जाने वाले कर्कवृत्त के कारण देश का अधिकांश भाग उष्ण टापू में आता है। फलस्वरूप यहाँ वर्ष भर तापमान अधिक रहता है।

भारत के वार्षिक औसत तापमान वियरण का मानचित्र देखने पर ऐसा ज्ञात होता है कि उत्तर में हिमालय के पर्वतीय भाग और उत्तर- पूर्व में सिक्किम, मेघालय और अरुणाचल प्रदेशों को छोड़कर अन्य किसी भी भाग में तापमान २०° से. के नीचे नहीं होता। औसत वार्षिक तापमान दक्षिण की ओर बढ़ता जाता है।



आकृति ३.१ भारत औसत वार्षिक तापमान

सबसे अधिक औसत वार्षिक तापमान २७° से. से अधिक आंध्र प्रदेश के पूर्वी भागों में तथा तमिलनाडु राज्य में होता है। राजस्थान, गुजरात, मध्य और पूर्व महाराष्ट्र, दक्षिण मध्य प्रदेश, छत्तीसगढ़, गंगा के अधिकतर मैदानी भागों में तापमान २०° से. से २७° से. तक होता है।

जम्मू-कश्मीर, उत्तरी भारत का हिमालय पर्वत क्षेत्र तथा उत्तर-पूर्व में पूर्वांचल प्रदेश के पहाड़ी भागों में तापमान पर्याप्त कम, अर्थात २०° से. से कम होता है।

औसत वार्षिक तापमान के इस वितरण में ऋतुओं के अनुसार क्षेत्रीय हेर-फेर होता है। जल और थल की उष्ण और शीत होने की भिन्न विशेषता के कारण ग्रीष्मकाल में दोनों स्थानों पर जलवायु संबंधी विरोधी स्थिति पैदा होती है, जिससे मानसून का निर्माण होता है।

ऋतुओं का बदलता स्वरूप यहाँ की जलवायु की एक प्रमुख विशेषता होने के कारण, जलवायु का अध्ययन वर्ष को ऋतुओं में विभाजित करके किया जाता है।

ऋतुएँ :

भारत में वर्ष का विभाजन निम्नांकित चार ऋतुओं में किया जाता है–

१. उष्ण हवाओं का ग्रीष्मकाल - मार्च से मई तक।
२. उष्ण और नम हवाओं का वर्षकाल - जून से सितंबर तक।
३. मानसून पीछे हटने का प्रत्यावर्तनकाल - अक्तूबर से नवंबर तक।
४. शुष्क और ठंडी हवाओं का शीतकाल - दिसंबर से फरवरी तक।

१. उष्ण हवाओं का ग्रीष्मकाल :

२१ मार्च के दिन सूर्यकिरण विषुवतवृत्त पर लंबवत पड़ती हैं। इसके पश्चात सूर्य का भामसान भ्रमण उत्तरी गोलार्ध में आरंभ होता है। भारत में इस समय सूर्यकिरणें लंबवत पड़ती हैं। दिनमान की कालावधि बढ़ती है। इससे तापमान बढ़ता जाता है और ग्रीष्मकाल की स्थिति निर्माण होती है। उत्तरी-पश्चिमी भारत में मई के महीने में सबसे अधिक तापमान होता है। इस क्षेत्र में दोपहर का तापमान ४०° से. से भी अधिक हो जाता है। इसी समय दक्षिण भारत में तापमान औसतन ३०° से. होता है, तो कभी-कभी ३६° से. तक पहुँच जाता है।

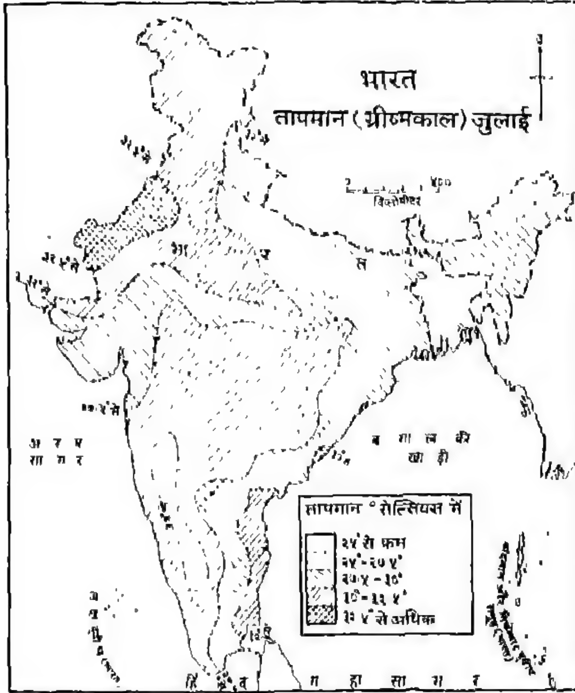
इस प्रकार इस कालावधि में तापमान बढ़ने के कारण वायुदाब कम हो जाता है। राजस्थान, पंजाब, हरियाना, उत्तर प्रदेश आदि राज्यों में वायुदाब सामान्यत: १००० मिलीबार से कम रहता है। इसी समय दक्षिणी सागरीय भागों पर वायुदाब १०१० मिलीबार से अधिक होता है।

ग्रीष्मकाल के समय उत्तरी भारत में अति उष्ण हवाएँ चलती हैं। इन्हें 'लू' कहते हैं। धूल के बादल भी इन दिनों में निर्माण होते हैं।

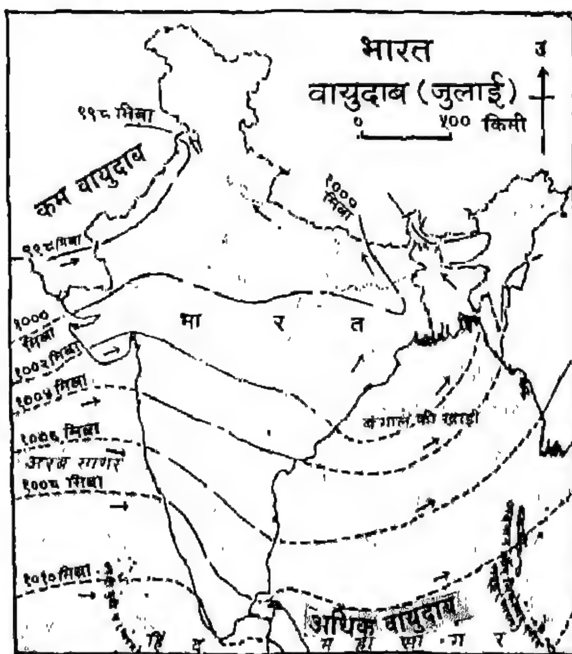
पश्चिम बंगाल और उड़ीसा के क्षेत्रों में बंगाल की खाड़ी पर से बाष्पयुक्त हवाएँ बहती आती हैं और दक्षिण-पश्चिम की ओर से उष्ण-शुष्क हवाएँ आती हैं। दोनों बहती हवाओं के संगम से गड़गड़ाते बादलों का निर्माण होता है। इन्हें ' नार्वेस्टर ' कहते हैं और पश्चिम बंगाल में ये 'कालबैसाखी' कहलाते हैं।

२. नम और उष्ण हवाओं का वर्षाकाल :

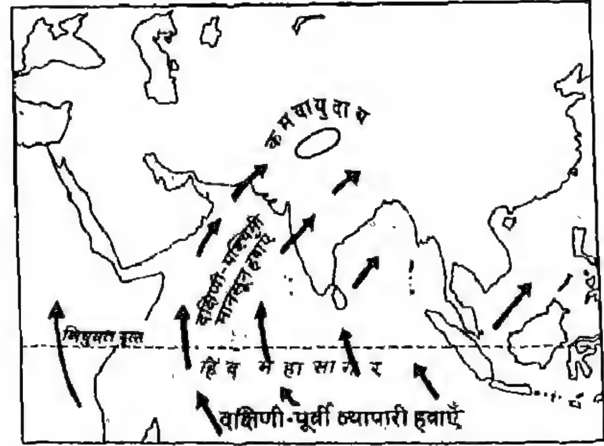
ग्रीष्मकाल में धीरे-धीरे उष्णता की मात्रा बढ़ती हुई मई के अंतिम सप्ताह तक सबसे अधिक हो जाती है। तापमान की यह स्थिति भारत के उत्तर-पश्चिम तथा उत्तरी भागों में जुलाई महीने तक रहती है। इसके परिणामस्वरूप इन भागों में वायुदाब १००० मिलीबार से कम हो जाता है। इसी समय दक्षिण गोलार्ध में



आकृति ३.२ भारत : ग्रीष्मकाल का तापमान (जुलाई)



आकृति : ३.३ भारत : ग्रीष्मकाल का वायुदाब (जुलाई)



आकृति ३.४ : दक्षिणी-पश्चिमी मानसून हवाएँ

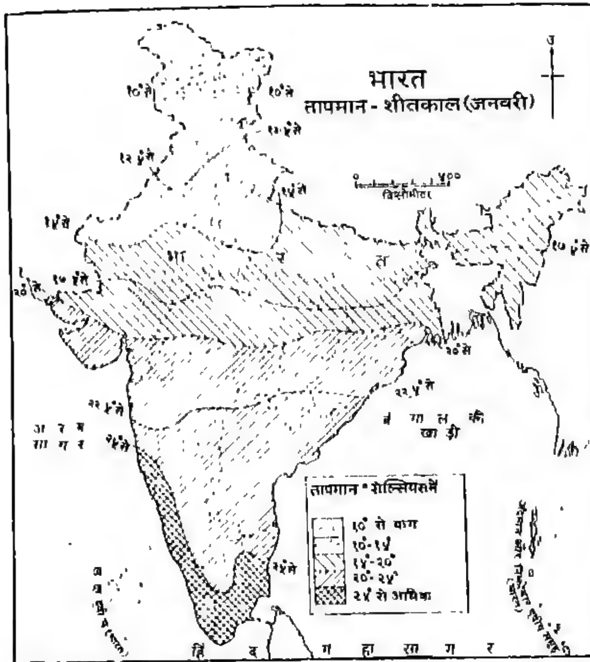
शीतकाल होता है, जिससे यहाँ वायुदाब अधिक रहता है। भारत के उत्तर-पश्चिम भागों में कम वायुदाब होने के कारण दक्षिणी-पूर्वी व्यापारिक पवनें विषुवतवृत्त पार करके उत्तरी गोलार्ध में प्रवेश करती हैं। फेरेल के नियमानुसार ये अपनी दाईं ओर मुड़ जाती हैं, जिससे इन्हें दक्षिण-पश्चिम से उत्तर-पूर्व की दिशा मिलती है। इन्हें ही दक्षिणी-पश्चिमी मानसून हवाएँ कहते हैं। यहीं से मानसून का अग्रिम अभियान प्रारंभ होता है।

दक्षिणी-पश्चिमी मानसून हवाएँ हिंद महासागर पर से होकर बहती हुई आने के कारण अपने साथ प्रचुर मात्रा में बाष्प वहन कर लाती हैं। इनसे ही भारत को वर्षा मिलती है। दक्षिणी-पश्चिमी मानसून हवाएँ भारत में दो मार्गों से प्रवेश करती हैं। अरब सागर से आने वाली हवाएँ भारत में पश्चिमी किनारों की ओर से आती हैं और ये उत्तर की ओर तथा पूर्व की ओर बहती जाती हैं। बंगाल की खाड़ी से आने वाली हवाओं की दो शाखाएँ हो जाती हैं। इनमें से एक शाखा हिमालय के पूर्व-पश्चिम विस्तार के कारण पश्चिम बंगाल पर से होती हुई पंजाब की ओर जाती है। पटकोई और राखीने योमा के दक्षिण-उत्तर विस्तार के कारण दूसरी शाखा मेघालय, असम और अरुणाचल प्रदेशों की ओर जाती है। भारत की संपूर्ण वर्षा (लगभग ८०% से भी अधिक वर्षा) दक्षिणी-पश्चिमी मानसून हवाओं से होती है।

३. मानसून प्रत्यावर्तनकाल :

दक्षिणी-पश्चिमी मानसून हवाएँ सामान्यतः सितंबर के मध्य तक बहती हैं। २३ सितंबर से सूर्य का भासमान भ्रमण दक्षिणी गोलार्ध में आरंभ होता है। उत्तरी गोलार्ध में सूर्य किरणें तिरछी पड़ने लगती हैं और दिनमान छोटा होता जाता है। उत्तर भारत में अधिक दाब क्षेत्र निर्माण होता है और वह धीरे-धीरे दक्षिण की ओर विस्तृत होता जाता है। परिणामतः दक्षिणी-पश्चिमी मानसून हवाओं का जोर उत्तर भारत में कम होने लगता है। ये दक्षिण की ओर और दक्षिण-पूर्व की ओर क्रम-क्रम से पीछे सरकने लगती हैं। इन्हें पीछे हटने वाली या प्रत्यावर्तनकाल की मानसून हवाएँ कहते हैं।

दक्षिणी-पश्चिमी मानसून हवाएँ प्रत्यावर्तित होने के बाद भारत में सूर्यप्रकाश की तीव्रता प्रतीत होने लगती है। विशेषतः अक्तूबर महीने में तापमान बढ़ता है और उसकी तीव्रता, हवा में



आकृति ३.५ भारत : शीतकाल में तापमान (जनवरी)

शुष्कता बढ़ने के कारण, अधिक अनुभूत होती है। इस कालावधि को 'संक्रमणकाल' कहते हैं। इसके पश्चात शीतकाल आरंभ होता है।

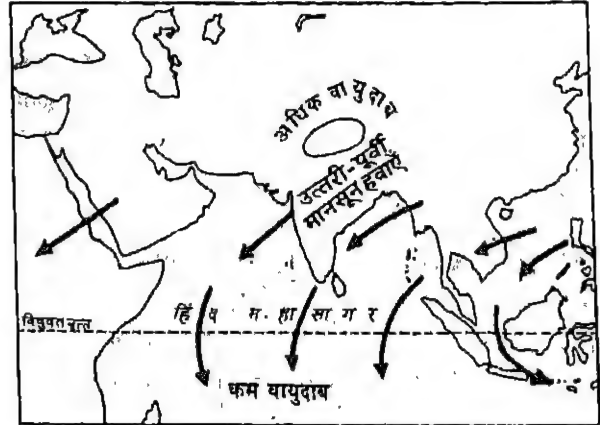
४. शुष्क और ठंडी हवाओं का शीतकाल :

२२ दिसंबर को मकरवृत्त पर सूर्य-किरणें लंबवत पड़ती हैं। इस समय भारत में सूर्य-किरणें तिरछी पड़ती हैं। दिनमान छोटा होता है। परिणामतः भारत में हवा ठंडी होती है। तापमान दक्षिण से उत्तर की ओर क्रमशः कम होता जाता है। दक्षिण भारत में जनवरी महीने में औसत तापमान २०° से. से थोड़ा अधिक होता है और उत्तर भारत में १५° से. से कम रहता है।



आकृति ३.६ भारत : शीतकाल में वायुदाब (जनवरी)

शीतकाल में कम तापमान के कारण भारतीय उपमहाद्‌वीप के उत्तरी भाग में अधिक वायुदाब का क्षेत्र निर्माण होता है। दक्षिण की ओर वायुदाब की मात्रा कम होती जाती है। भूभाग के अधिक दाबवाले क्षेत्र से हिंद महासागर के कम दाबवाले क्षेत्र की ओर हवाएँ बहने लगती है। फेरेल के नियमानुसार ये अपनी दाईं ओर मुड़ जाती हैं और उन्हें उत्तर-पूर्व से दक्षिण-पश्चिम की दिशा प्राप्त होती है। अतः इन्हें उत्तरी-पूर्वी मानसून हवाएँ कहते हैं।



आकृति ३.७ भारत : उत्तरी-पूर्वी मानसून हवाएँ

उत्तरी-पूर्वी मानसून हवाएँ मंद गति से समुद्र की ओर बहती हैं। ये ठंडी और शुष्क होती हैं। बंगाल की खाड़ी के ऊपर से बहती हुई ये बाष्पयुक्त हो जाती हैं। आगे चलकर ये आंध्र प्रदेश और तमिलनाडु के पूर्वी किनारों पर शीतकाल में वर्षा करती हैं।

शीतकाल में जम्मू-कश्मीर तथा उत्तर भारतीय मैदान में भारत की पश्चिमी दिशा से आने वाली चक्रवाती हवाओं से वर्षा होती है। शीतकाल में चक्रवात के समय आकाश मेघाच्छन्न होता है और हवा थोड़ी उष्णार्द्र हो जाती है। इस चक्रवातिक स्थिति के बाद देश में थोड़ी शीतलहर चलती है। भारत की मानसून हवाओं की विशेषताओं का प्रभाव वर्षा की मात्रा और वितरण पर पड़ता है।

वर्षा का वितरण :

भारत में जून से सितंबर तक वर्षाकाल होता है। इस कालावधि में भारत की संपूर्ण औसत वार्षिक वर्षा का अधिकांश जल बरस जाता है। भारत की प्राकृतिक रचना एवं सागरी तटवर्ती अंतर इन घटकों का परिणाम वर्षा वितरण पर दिखाई देता है।

पश्चिमीघाट से मानसून हवाएँ अवरुद्ध होती हैं और ऊर्ध्वगामी होकर ऊपर उठती हैं। इनमें समाई बाष्प का संघनन होता है। ये हवाएँ घाट की पश्चिमी ढलानों पर वर्षा करती हैं। यह प्रतिरोधी वर्षा होती है। इस क्षेत्र में ऊँचाई के अनुसार वर्षा की मात्रा बढ़ती जाती है। महाबळेश्वर में वार्षिक वर्षा लगभग ६७५ सेमी. होती है। ये हवाएँ पश्चिमीघाट पार करके पूर्वी ढलान पर नीचे उतरती हैं। परिणामतः तापमान बढ़ने से इनकी बाष्प ग्रहण क्षमता बढ़ती है। इन हवाओं में पूर्वी भागों में बहुत थोड़ी वर्षा मिलती है। यही कारण है कि तलहटी के क्षेत्रों में वृष्टिछाया का प्रदेश बन गया है। इस भाग में स्थित वाई में ७१ सेमी. वर्षा होती है।

बंगाल की खाड़ी पर से होकर आने वाली मानसून हवाएँ गारो, जयंतिया आदि पहाड़ी प्रदेशों में प्रवेश करती हैं। पहाड़ियों के सँकरे भागों से होकर ये हवाएँ ऊपर उठती हैं, ये मूसलाधार वर्षा करती हैं। मेघालय राज्य में खासी पहाड़ी की दक्षिणी ढलान पर स्थित मौसीनराम और चेरापूँजी के परिसर में वार्षिक औसत वर्षा १२०० सेमी. होती है। इसके विपरीत चेरापूँजी के उत्तर में खासी पहाड़ी के वृष्टिछायावाले क्षेत्र में चेरापूँजी के समीप ही स्थित शिलाँग नगर में १४० सेमी. और गुवाहटी में १०० सेमी. वर्षा होती है।

तटवर्ती भागों से देश के भीतरी क्षेत्रों में क्रमशः वर्षा की मात्रा कम होती जाती है। वर्षा करती हवाएँ, आगे बढ़ती हुई, शुष्क होती जाती हैं। कोलकला से, गंगा-कछारों से होकर, पंजाब की ओर बढ़ती वर्षा की मात्रा में कमी होती जाती है।

शीतकाल में बंगाल की खाड़ी पर से होकर बहने वाली उत्तरी -पूर्वी मानसून हवाओं से आंध्र प्रदेश और तमिलनाडु के समुद्र तटवर्ती भागों में थोड़ी वर्षा होती है। किनारों से दूर पश्चिम की ओर बढ़ती हुई भीतरी भागों में वर्षा की मात्रा कम होती जाती है।

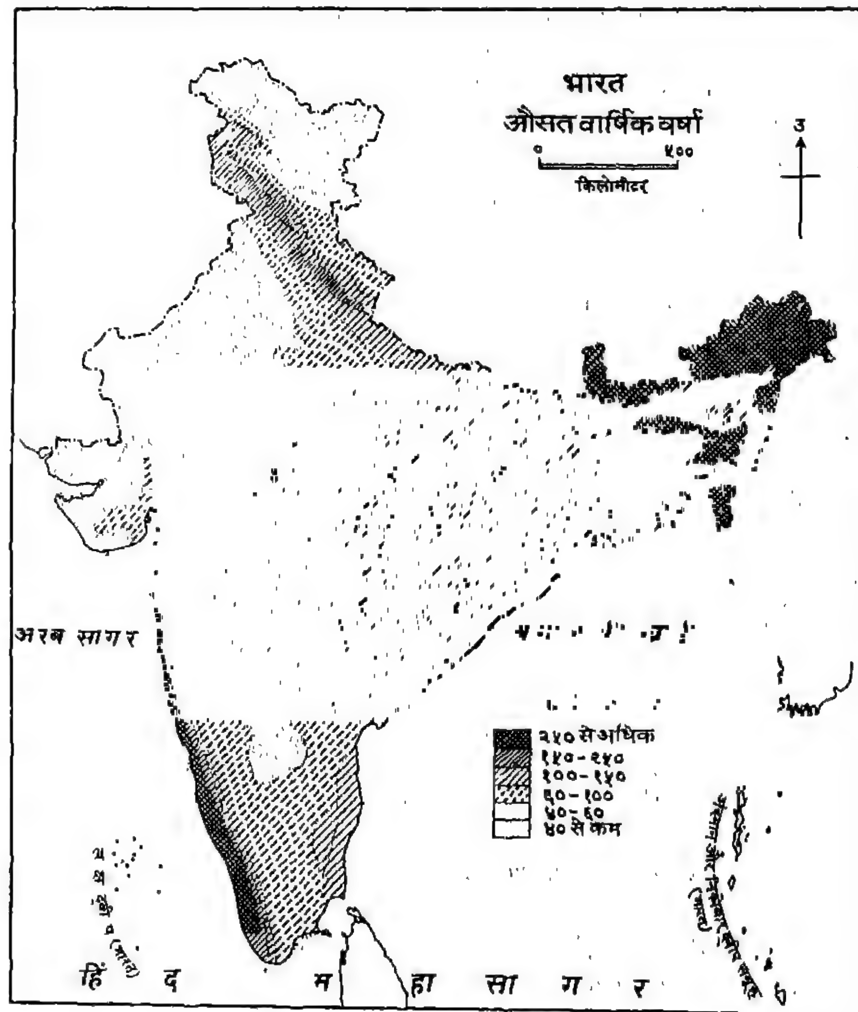
वर्षा के विभाग :

भारत की औसत वार्षिक वर्षा वितरण के मानचित्र का निरीक्षण करके निम्नांकित वर्षा-विभाग किए जा सकते हैं।

१. अत्यल्प वर्षा के प्रदेश (४० सेमी. से कम) :
गुजरात में कच्छ का रन, पश्चिमी राजस्थान, जम्मू-कश्मीर के उत्तर का क्षेत्र, दक्षिण-पश्चिम पंजाब और पश्चिम हरियाणा आदि भागों में अत्यल्प वर्षा होती है।

२. कम वर्षा के प्रदेश (४० सेमी. से ६० सेमी.) :
पूर्वी राजस्थान, पश्चिमी गुजरात, पश्चिमी पंजाब, पूर्वी और मध्य हरियाना आदि प्रदेशों तथा भारतीय पठार के वृष्टिछायावाले क्षेत्रों का समावेश इस विभाग में होता है।

३. मध्यम वर्षा के प्रदेश (६० सेमी. से १५० सेमी.) :
मध्यम वर्षावाले प्रदेश सामान्यतः दो भागों में विभाजित होते हैं। जम्मू-कश्मीर का दक्षिण-पश्चिम भाग, उत्तर भारतीय मैदान का पश्चिमी भाग, मध्य प्रदेश व गुजरात के कुछ भाग, महाराष्ट्र, कर्नाटक, आंध्र प्रदेश, तमिलनाडु आदि राज्यों के कुछ भागों में



आकृति ३.८ भारत : वार्षिक वर्षा - वितरण

लगभग ६० सेमी. से १०० सेमी. तक वर्षा होती है। इन्ही उपप्रदेशों के पूर्वी भागों में वर्षा की मात्रा १०० सेमी. से १५० सेमी. तक मिलती है। इनमें प्रमुखतः उत्तर प्रदेश का पूर्वी भाग, बिहार, झारखंड, पश्चिम बंगाल, मध्य प्रदेश, छत्तीसगढ़, उडीसा आदि राज्यों का समावेश होता है। भारत का अधिकांश भाग मध्यम वर्षा के प्रदेश में आता है।

४. अधिक वर्षा के प्रदेश (१५० सेमी. से २५० सेमी.) :
इस वर्षा विभाग में हिमालय की तलहटी के प्रदेश, पश्चिमी घाट के ऊँचाईवाले क्षेत्र, छत्तीसगढ़, पश्चिम बंगाल के उत्तरी भाग के क्षेत्र तथा असम का समावेश होता है।

५. अत्यधिक वर्षा के प्रदेश (२५० सेमी. से अधिक) :
भारत में इसका बहुत छोटा क्षेत्र है। इसमें भारत का पश्चिमी किनारा, अरुणाचल प्रदेश, मेघालय, मिजोरम आदि का समावेश होता है।

भारतीय वर्षा की विशेषताएँ :

भारतीय वर्षा की कुछ विशेषताएँ हैं। इन विशेषताओं का प्रभाव यहाँ के कृषि-व्यवसाय और मानव जीवन पर स्पष्ट दिखाई देता है।

वितरण की असमानता :

यह भारत के वर्षा की महत्वपूर्ण विशेषता है। जून में मानसूनी वर्षा आरंभ हो जाने के बाद सितंबर तक होती रहती है। वर्षाकाल की इस संपूर्ण कालावधि में आर्द्रता (पानी बरसने) और शुष्कता (पानी न बरसने) के दिन उलट-पलटकर आते-जाते रहते हैं। वर्षा आरंभ हुई कि कुछ दिनों तक होती रहती है। इसे 'आर्द्रताकाल' कहते हैं। इसके बाद कुछ दिनों तक वर्षा नहीं होती। इसे 'शुष्कताकाल' कहते हैं। इस प्रकार उलट-पलटकर आर्द्रता और शुष्कता की स्थिति फसलों की वृद्धि में लाभदायक है; किंतु जब आर्द्रता और शुष्कता की अवधि दीर्घ अथवा अल्प काल की होती है, तब फसलें गल जातीं या सूख जाती हैं। परिणमतः उपज की हानि होती है।

अनिश्चितता और अनियमितता :

ये वर्षा की प्रमुख विशेषताएँ हैं। वर्षा की अनिश्चितता उसके समय और उसकी मात्रा, दोनों के संबंध में है। वर्षा का प्रारंभ कभी जल्दी तो कभी देरी से होता है। वर्षा देर से आई, तो कृषि - कार्यक्रम बिगड़ता है और उत्पादन पर प्रतिकूल प्रभाव पड़ता है। कभी-कभी वर्षा बहुत जल्द प्रारंभ हो जाती है और फसलें बढ़ने के समय तक समाप्त हो जाती है। इसलिए वर्षा के शुरु होने तथा समाप्त होने तक का निश्चित पुर्वानुमान करना कठिन हो जाता है।

वर्षा के समय के संबंध में जैसी अनिश्चितता है, वैसी ही अनिश्चितता इसकी मात्रा के संबंध में भी है। प्रायः ऐसा होता है कि किसी वर्ष अधिक तो किसी वर्ष कम वर्षा होती है। वर्षाकाल के एकाध महीने में निरंतर अधिक वर्षा होने से नदियों में बाढ़ आ जाती है। कभी-कभी वर्षा की मात्रा इतनी कम होती है कि धरती सूख जाती है और उसमें दरारें पड़ जाती हैं। इस स्थिति में फसलें सूख जाती हैं।

केंद्रीयता : मानसूनी वर्षा की एक महत्वपूर्ण विशेषता है। कभी-कभी वर्षभर की सारी वर्षा एक महीने में ही हो जाती है और शेष महिने सूखे रह जाते हैं। सारे भारत में दक्षिणी-पश्चिमी मानसून के चार महीनों में ८०% वर्षा हो जाती है। शेष रहे आठ महीनों में कम-अधिक २०% वर्षा होती है। कम समय में अधिक वर्षा का होना फसलों की वृद्धि के लिए हानिकर है।

संपूर्ण वर्षाकाल में यदि १०० सेमी. वर्षा समय पर, नियमित अंतर से तथा योग्य रूप से वितरित हो तो वह कृषि के लिए लाभप्रद होती है; किंतु मानसूनी वर्षा का 'विचलन' अधिक है। वर्षा के विचलन का आशय है औसत वार्षिक वर्षा की अपेक्षा अधिक अथवा कम वर्षा का होना। कम वर्षावाले अकालग्रस्त भागों में यह विचलन स्थिति अधिक मिलती है। अतः संपूर्ण वर्षा का वितरण, वर्षाकाल की पूरी अवधि में, किस स्वरुप का है इसकी जानकारी महत्वपूर्ण है। इससे यह ध्यान में आ जाता है कि भारत में वर्षा पर पूर्णतः भरोसा करके नहीं रहा जा सकता।

वर्षा की इन विशेषताओं के कारण भारत में बाढ़ तथा अनावृष्टि की समस्या का निर्माण होता है।

बाढ़-समस्या :

वर्षाकाल में निरंतर दीर्घकाल तक होने वाली मुसलाधार वर्षा के कारण भूमि जलसंपृक्त हो जाती है। भारत में बाढ़ के कारण होने वाली भयंकर हानी के अनेक उदाहरण हैं। उत्तर प्रदेश, बिहार, झारखंड, पश्चिम बंगाल, उड़ीसा और असम राज्यों में बाढ़ हमेशा की समस्या है। वर्षा काल में अधिक वर्षा के कारण, तो ग्रीष्मकाल में हिमालय की बर्फ पिघलने से उत्तर भारत की नदियों में बाढ़ आती है।

नदियों के जलग्रहण क्षेत्रों में वृक्ष कटाई और भूमि पर वानस्पतिक आवरण में कमी आने के कारण भूपृष्ठीय जलप्रवाहों में अवरोध नहीं रह जाता। इनका वेग तीव्र होने से भू-क्षरण होता है और नदियों के पात्र में शीघ्रता से पानी एकत्र हो जाने से नदियों में बाढ़ आती है। बाढ़ के कारण नदी के पात्र में काँप जमा होती है। जिससे उलथापन बढ़ता है और बाढ़ का पानी आस-पास के मैदानी प्रदेशों में शीघ्र फैलता है।

किसी समय दामोदर, कोसी, गंडक, ब्रह्मपुत्र आदि नदियाँ बाढ़ से होने वाले विनाश के लिए कुप्रसिद्ध थीं। बहु-उद्देश्यीय नदी योजनाओं के कारण बाढ़ की स्थिति में बड़ी कमी आई है। उत्तर भारत की नदियों की तुलना में दक्षिणी पठार की नदियों में आने वाली बाढ़, वहाँ की कम वर्षा के कारण, अधिक भयानक नहीं होती।

अनावृष्टि की समस्या :

औसत वार्षिक वर्षा-वितरण का मानचित्र देखने से ज्ञात होता है कि भारत के अनेक भागों में वर्षाकाल में कम पानी बरसता है। कितने ही सप्ताह वर्षा होती ही नहीं। इससे अनावृष्टि की स्थिति निर्माण होती है। भारत के जिन प्रदेशों में ५० सेमी. से कम वर्षा होती है, वहाँ अनावृष्टि की स्थिति का बार-बार निर्माण होता है। राजस्थान, पंजाब, गुजरात तथा दक्षिण भारत के वृष्टिछायावाले प्रदेशों में ऐसी स्थिति का निर्माण होता रहता है पर सिंचाई की

सुविधा से कुछ भागों में अनावृष्टि की तीव्रता कम होने में सहायता मिली है।

मानसून जलवायु की एकरूपता और विविधता :

मानसून जलवायु की एकरूपता में विविधता दिखाई पड़ती है, जो प्रमुखतः वर्षा के असमान वितरण के कारण है। इस वितरण के परिणामस्वरूप कृषि तथा मानव जीवन में विविधता का निर्माण हुआ है।

विशाल भारत की जलवायु, मात्र एक शब्द 'मानसून' से स्पष्ट होती है। यह इसकी एकरूपता का सबसे बड़ा प्रमाण है। मानसून शब्द स्पष्टतः ऋतु में परिवर्तन सूचित करता है। ऋतुओं के अनुसार होने वाला परिवर्तन मानसूनी जलवायु की प्रमुख विशेषता है। पश्चिम बंगाल में चावल की तथा राजस्थान में बाजरे की खेती के क्षेत्रों पर केवल मानसून का प्रभाव है। जलवायु की एकरूपता कृषिकार्य, व्यवसाय, फसलें उगाना, परंपरा आदि से स्पष्ट होती है।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :
   - क. भारत की जलवायु .... प्रकार की है।
   - ख. ग्रीष्मकाल में भारत के उत्तरी-पश्चिमी भाग में दाब का केंद्र निर्माण होता है।
   - ग. पश्चिम बंगाल में गड़गड़ाने वाले बादलों को ....कहते हैं।
   - घ. अक्तूबर महीने में भारतीय जलवायु का ...., काल होता है।
   - ङ. कोकण में .... प्रकार की वर्षा होती है।

२. कारण लिखो :
   - च. महाबळेश्वर की अपेक्षा वाई में वर्षा की मात्रा कम होती है।
   - छ. भारत में शीतकाल में उत्तरी-पूर्वी मानसून हवाएँ चलती हैं।
   - ज. चेरापूँजी में वर्षा की मात्रा अधिक होती है।
   - झ. पश्चिम बंगाल से पंजाब की ओर बढ़ती हुई वर्षा की मात्रा कम होती जाती है।

३. अंतर स्पष्ट करो :
   - ट. दक्षिणि-पश्चिमी मानसून हवाएँ तथा उत्तरी-पूर्वी मानसून हवाएँ
   - ठ. शीतकाल की स्थिति और ग्रीष्मकाल की स्थिति
   - ड. अनावृष्टिग्रस्त प्रदेश और बाढ़ग्रस्त प्रदेश

४. टिप्पणियाँ लिखो :
   - त. नार्वेस्टर
   - थ. मानसूनी वर्षा का विचलन
   - द. मानसूनी जलवायु की विविधता

५. आकृति का पठन करके निम्नांकित प्रश्नों के उत्तर लिखो :
   - प. पूर्व में अधिक वर्षा वाले राज्य कौन-से हैं ?
   - फ. अति उत्तर में कम वर्षा वाले राज्यों के नाम लिखो।
   - ब. पश्चिमी तटवर्ती क्षेत्रों में औसत वर्षा कितनी सेमी. होती है ?

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दूरदर्शन पर दर्शाए गए मौसम के पूर्वानुमान के अनुसार दिल्ली और मुंबई के नवम्बर महीने के अधिकतम और न्यूनतम तापमानों का अंकन अपनी कापी में करो और औसत मासिक तापमान निकालो।



चक्रवात (उपग्रह फोटो)

***

प्रकरण ४

जलसंपत्ति

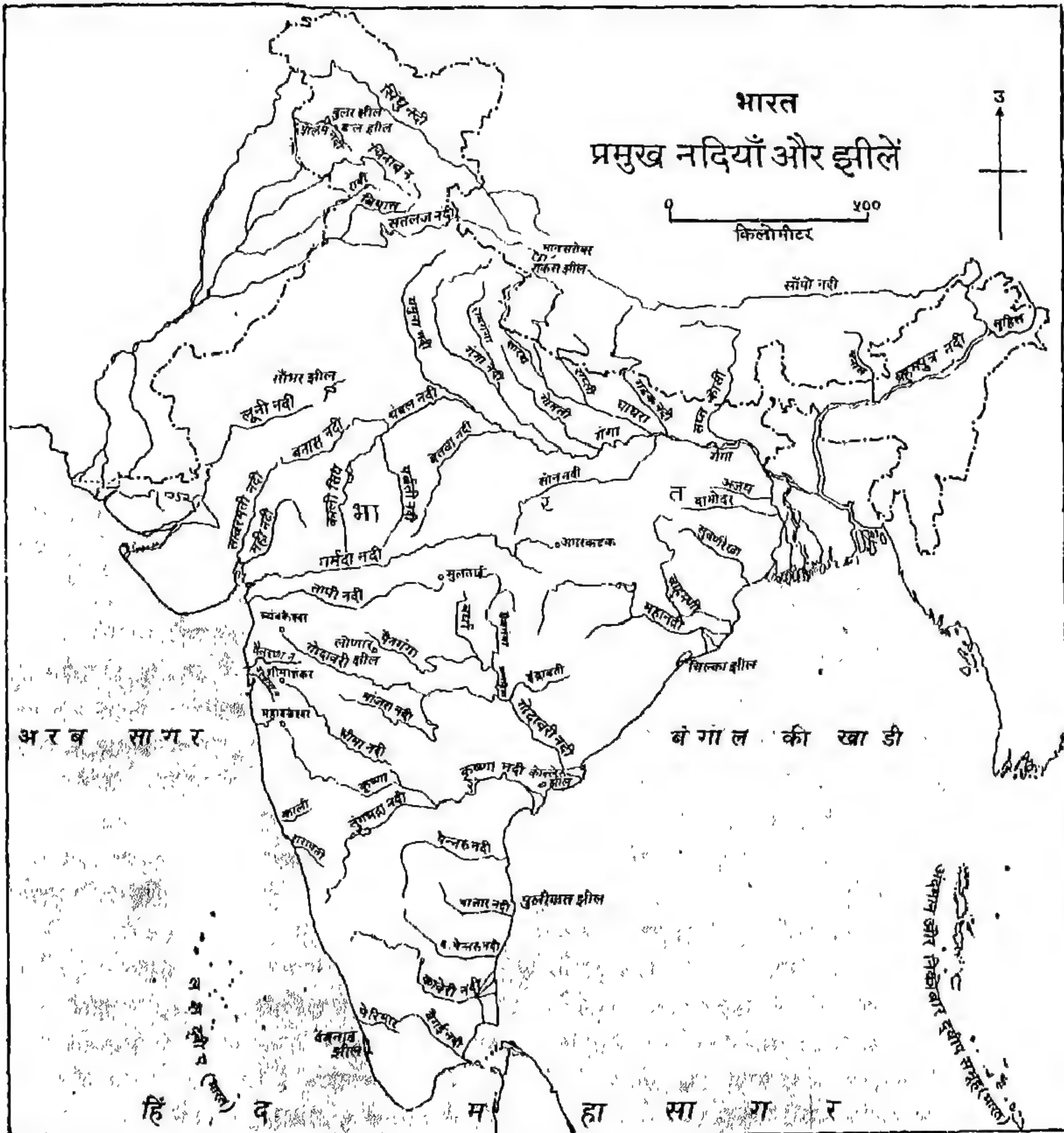
हमें मालूम है कि मानव जीवन में पानी का बड़ा महत्व है। घरेलू उपयोग के अलावा कृषि तथा औद्योगिक क्षेत्रों में पानी का उपयोग आज-कल बहुत मात्रा में किया जाता है। पानी पर्याप्त उपलब्ध होने से हमें उसके महत्व की प्रतीति नहीं होती।

पानी का एकमेव प्रथम स्त्रोत वर्षा है। नदियाँ, हिमनदियाँ, झीलें, झरने, कुएँ आदि द्वितीयक स्त्रोत हैं। वर्षा का पानी प्रवाहित, संग्रहित करके उसका नियमन करने के लिए नदियों, झीलों आदि का महत्व है, किंतु वर्षा के अभाव में नदियाँ, झीलें, कुएँ आदि सूखे पड़े रह जाते हैं। अतः वर्षा ही एक अक्षय स्वरूप की जलसंपत्ति है।

पिछले प्रकरण में हमने भारत में वर्षा की मात्रा तथा वितरण का अध्ययन किया। इस प्रकरण में हम यह देखेंगे कि देश में जलसंपत्ति का वितरण किस रूप में हुआ है।

भारत की नदियाँ :

किसी भी प्रदेश के नदी-प्रवाह का स्वरूप प्रदेश की प्राकृतिक



आकृति ४.१: भारत : प्रमुख नदियाँ तथा झीलें

रचना, भूभाग की ढलान, जलप्रवाह के वेग आदि पर निर्भर होता है। जलविभाजक और जलग्रहण क्षेत्रों को ध्यान में रखकर भारत में हिमालय से उद्गमित नदियों तथा भारतीय पठार पर की नदियों के दो गुट किए जा सकते हैं।

१. हिमालय से उद्‌गमित नदियाँ :

उत्तर भारत की प्रमुख नदियों का उद्गम स्थल हिमालय पर्वत है। लंबाई में बड़ी ये नदियाँ बारह महीने बहती रहती हैं। हिमालय श्रेणियों में होने वाले वर्षाजल के वितरण का महत्वपूर्ण कार्य उत्तर भारत में ये नदियाँ करती हैं। वर्षा के समय इन नदियों में बड़ी बाढ़ आती है और ग्रीष्म के समय हिमालय की बर्फ पिघलने से इनमें पर्याप्त जल रहता है। मैदानी भागों में ये नदियाँ काँप का संचयन करती हैं, जिससे नदियों के कछार उपजाऊ बन जाते हैं। सिंचाई और जलविद्युत निर्माण के लिए ये नदियाँ उपयोगी हैं। इनके अतिरिक्त इनका शांत-मंद प्रवाह जल यातयात के लिए उपयोगी है।

हिमालय से उद्गमित नदियों के दो विभाग–अरब सागर में मिलने वाली और बंगाल की खाड़ी में मिलने वाली नदियों के रूप में – किए जा सकते हैं।

हिमालय एक बहुत बड़ा और विस्तृत जलविभाजक है। इसकी ऊँचाई उत्तर की ओर बढ़ती जाती है। इसके कारण मानसून की अधिकांश वर्षा का लाभ अपने देश को मिलता है। परिणामतः हिमालय की नदियाँ जल का विशाल संग्रह लेकर भारतीय मैदान में प्रवेश करती है।

अ. अरब सागर में मिलने वाली नदियाँ :

सिंधु नदी हिमालय में मानसरोवर के उत्तर से उद्गमित है। यह कश्मीर से होकर बहती हुई आगे चलकर पाकिस्तान में प्रवेश करती है। इसकी लंबाई लगभग २९०० किमी. है; किंतु केवल ७०० किमी. लंबाई का प्रवाह भारत में है।

सतलज भी मानसरोवर के समीप राकस झील से उद्गमित है। यह हिमाचल प्रदेश और पंजाब राज्य से होकर बहती हुई पाकिस्तान में जाकर सिंधु से मिलती है। सतलज की सहायक नदियाँ–झेलम, चिनाब, रावी, बियास आदि–भी हिमालय से उद्गमित हैं। इन नदियों के पानी का सिंचाई के लिए उपयोग न हुआ होता, तो पंजाब में कृषि–उद्योग का विकास नगण्य रह जाता।

ब. बंगाल की खाड़ी में मिलने वाली नदियाँ :

भारत में इन नदियों का क्षेत्र बहुत विस्तृत है। साथ ही, भारत की जलसंपत्ति में इनका योगदान भी बड़ा है।

गंगा, यहाँ की नदियों में प्रमुख है। इसका उद्गम स्थल पश्चिमी हिमालय में गंगोत्री है। भारत की यह सबसे लंबी नदी लगभग २५०० किमी. की यात्रा करती हुई बंगाल की खाड़ी में मिलती है। उत्तर की ओर से इसमें रामगंगा, घाघरा, गंडक, कोसी आदि नदियाँ आकर मिलती हैं। गंगा की सबसे बड़ी सहायक नदी **यमुना**, हिमालय में यमुनोत्री से उद्गमित होकर, उत्तर भारतीय मैदान से होकर बहती हुई इलाहाबाद के समीप गंगा में मिलती है। चंबल, सिंध, बेतवा, केन आदि नदियाँ मालवा पठार से उद्गमित होकर यमुना में आकर मिलती हैं। गंगा-यमुना संगम के पश्चात आगे चलकर दक्षिण की ओर से बहकर आता हुआ सोन नद गंगा में मिलता है। पटना के पूर्व में राजमहल की पहाड़ियों का अर्धचक्र लगाकर गंगा दक्षिण की ओर मुड़ती है। बंगाल की खाड़ी में मिलते हुए गंगा ने अपने मुहाने पर विस्तृत डेल्टा (त्रिभुज) प्रदेश का निर्माण किया है। डेल्टा क्षेत्र में गंगा का पानी असंख्य धाराओं में विभाजित हो जाता है, जिनमें सबसे बड़ी धारा हुगली नदी है।

ब्रहमपुत्र नदी का उद्गम मानसरोवर के समीप है। तिब्बत में इसे साँगपो कहते हैं। पूर्व की ओर बहती हुई यह भारत के अरुणाचल प्रदेश में आती है। आगे यह असम से होकर बहती हुई दक्षिण में मुड़कर गंगा से मिलती है। वर्षा के समय ब्रहमपुत्र में महाबाढ़ आती है।

ये नदियाँ उत्तर भारत में विशाल जलसंपत्ति लाती हैं, जिसमें से बहुत ही थोड़े जल का उपयोग हम कर सके हैं। शेष जल समुद्र में जा मिलता है।

२. भारतीय पठार की नदियाँ :

हिमालय से उद्गमित नदियों की तुलना में भारतीय पठार पर बहने वाली नदियाँ कम लंबाई की हैं। इन नदियों में वर्षाकाल में पानी अधिक रहता है। ग्रीष्मकाल में अधिकतर नदियाँ सूखी रहती हैं। कम वर्षावाले भारतीय पठारी प्रदेश में नदियों का महत्व बहुत है। सिंचाई और जलविद्युत-निर्माण के लिए इन नदियों का उपयोग किया जाता है। प्रवाह के दिशानुसार इन नदियों के चार विभाग किए जा सकते हैं।

अ. दक्षिण प्रवाहिनी नदियाँ :

भारतीय पठार के उत्तरी-पश्चिमी भाग में अरावली पर्वत से निकलने वाली लूनी और साबरमती तथा विंध्य पर्वत से निकलने वाली माही नदी दक्षिण की ओर बहती हुई अरब सागर में मिलती हैं।

आ. उत्तर प्रवाहिनी नदियाँ :

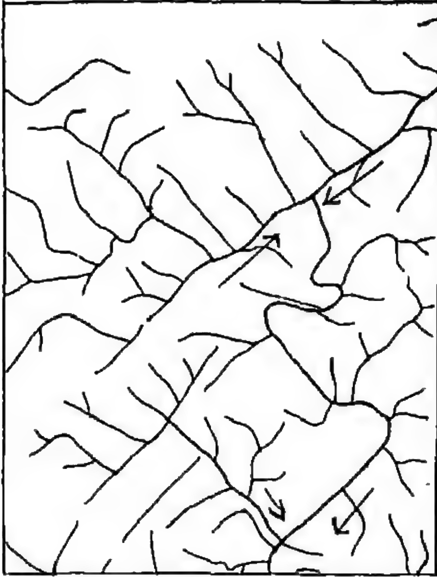
उत्तर भारतीय पठार पर बहने वाली नदियों में चंबल, सिंध, बेतवा, केन आदि का समावेश है।

इ. पश्चिम प्रवाहिनी नदियाँ :

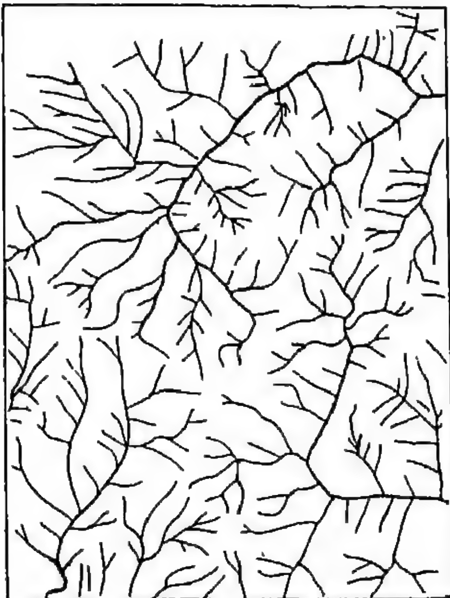
नर्मदा और तापी पश्चिम प्रवाहिनी प्रमुख नदियाँ हैं। **नर्मदा नदी** मैकल पर्वत में अमरकंटक से उद्गमित होती है। पश्चिम की ओर बहते हुए यह भड़ोच के समीप अरब सागर में मिलती है। इसके प्रवाह मार्ग में जबलपुर के निकट भेड़ाघाट स्थल पर दर्शनीय नमूनेदार प्राकृतिक रचना और धुआँधार प्रपात देखने को मिलता है।

तापी नदी मुलताई के समीप महादेव पहाड़ी से निकलती है। यह पश्चिम की ओर बढ़ती हुई सूरत के निकट अरब सागर में मिलती है। इसमें पूर्णा, गिरणा, पांझरा आदि नदियाँ आकर मिलती हैं।

पश्चिम घाट के कारण दक्षिण भारतीय नदियों के – पूर्व प्रवाहिनी और पश्चिम प्रवाहिनी – दो विभाग होते हैं। पश्चिम प्रवाहिनी नदियाँ बहुत ही कम लंबाई की तथा तीव्र गति से बहने वाली वर्षाकालीन नदियाँ हैं। वैतरणा, तानसा, उल्हास, सावित्री, वाशिष्ठी, तेरेखोल, मांडवी, शरावती, पेरियार आदि यहाँ की प्रमुख नदियाँ हैं।



आकृति ४.२ : आयताकार अपवाह



आकृति ४.३ : वृक्षाकार अपवाह

ई. पूर्व प्रवाहिनी नदियाँ :

दक्षिण भारतीय पठार पर महानदी, गोदावरी, कृष्णा, पेन्नेरू, कावेरी आदि महत्वपूर्ण नदियाँ हैं । ये सभी नदियाँ बंगाल की खाड़ी में मिलती हैं ।

महानदी छत्तीसगढ़ पठार की पहाड़ी श्रेणियों से निकलती है। पहले उत्तर की ओर और बाद में पूर्व की ओर मुड़कर बंगाल की खाडी में मिलती है।

भारतीय पठार की सबसे बड़ी नदी गोदावरी सह्याद्रि पर्वत में त्र्यंबकेश्वर के निकट से उद्‌गमित होती है। इसमें इंद्रावती, प्राणहिता, मांजरा आदि नदियाँ मिलती हैं । गोदावरी नदी में वर्षभर पानी रहता है । इस नदी ने अपने मुहाने पर विस्तृत डेल्टा क्षेत्र का निर्माण किया है ।

कृष्णा नदी सह्याद्रि के महाबळेश्वर स्थान से उद्‌गमित होती है। यह पूर्व की ओर बहती हुई बंगाल की खाड़ी में मिलती है। इसमें भीमा, कोयना, पंचगंगा, घटप्रभा और तुंगभद्रा नदियाँ मिलती हैं ।

भारत में इन नदियों के वितरण और पानी की आवश्यकता को ध्यान में रखकर जलसंपत्ति व्यर्थ न जाने के लिए उचित व्यवस्था करने की आवश्यकता है ।

अपवाह (Drainage) :

भू-पृष्ठ रचना, चट्टानों का स्वरुप, भू-ढलान आदि के अनुसार मुख्य नदी और उसकी सहायक नदियाँ मिलकर जलप्रवाह की एक रुपरेखा तैयार कर देती हैं, जिसे अपवाह प्रणाली कहते हैं। भारत में प्रमुख अपवाह निम्नांकित स्वरुप के मिलते हैं ।

एक ही प्रकार की चट्टानों तथा उनकी समान रचना वाले भागों में नदियों का वृक्षाकार अपवाह विकसित होता है । उत्तर भारतीय मैदान तथा भारतीय पठार के अधिकांश भागों में वृक्षाकार अपवाह का विकास दीखता है। चट्टानों में जोड़ या संधि होने पर अथवा क्षेत्र में स्तरभ्रंश होने पर यहाँ की मुख्य नदियों से सहायक नदियाँ लगभग समकोण पर मिलती हैं । ऐसी स्थिति में यहाँ आयताकार अपवाह विकसित होता है। मध्य प्रदेश में नर्मदा नदी की घाटी में, कर्नाटक में कृष्णा नदी के क्षेत्र में तथा पश्चिम बंगाल में दामोदर की घाटी में ऐसी प्रणाली मिलती है ।

झीलें :

भारत में झीलों की संख्या कम है । डल, वूलर, साँभर, चिल्का, कोलेरू, पुलिकत, बेंबनाड, लोणार आदि यहाँ की प्रमुख झीलें हैं। कुमाऊँ के हिमालय क्षेत्र के नैनीताल जिले में सात झीलें हैं । उत्तरी कश्मीर में डल, वूलर झीलें हैं, जो पर्यटकों के लिए आकर्षण स्थल हैं । राजस्थान में जयपुर के समीप साँभर और महाराष्ट्र मे बुलढाणा जिले में लोणार में खारे पानी की झीलें हैं। उड़ीसा राज्य में चिल्का झील भारत की सबसे बड़ी खारे पानी की झील है। चेन्नई के समीप पुलिकत अनूप झील है। गोदावरी और कृष्णा नदी के डेल्टा प्रदेश के बीच कोलेरू मीठे पानी की झील है। केरल के किनारों से लगकर लंबी-लंबी अनूप झीलें हैं। इन्हें कयाल कहते हैं। इनमें से बेंबनाड सबसे बड़ा खारे पानी का कयाल है।

भूजल :

भारत में वर्ष के चार महीने वर्षा होती है। हमें यह ज्ञात है कि वर्षा का वितरण यहाँ असमान है। वर्षा की अनिश्चितता के कारण भूजल-भंडार कृषि तथा अन्य कार्यों के लिए उपयोगी होता है। क्षेत्र की वर्षा-मात्रा और चट्टानों की सछिद्रता आदि पर भूजल-भंडार निर्भर होता है ।

भूजल हम कुएँ, नलकूप आदि से प्राप्त करते हैं । उत्तर भारतीय मैदान को हिमालय पर होने वाली वर्षा तथा नदियों से पर्याप्त जलपूर्ति होती है । नदियों के रास्ते पानी भूपृष्ठ पर बहता है । इस क्षेत्र में सर्वत्र काँप होने से पानी रिसता है और भूजल में वृद्‌धि होती है। यही कारण है कि दक्षिण भारतीय पठारी प्रदेश की अपेक्षा उत्तर भारतीय मैदान में भारत के अधिकतर भूजल-भंडार केंद्रित हो गए मिलते हैं। दक्षिण भारतीय पठार का बहुत-सा भाग अछिद्र अग्निजन्य चट्टानों से निर्मित है। अतः पानी को जमीन में

रिसने का अधिक अवसर नहीं मिलता । परिणामतः यहाँ भूजल-भंडार कम है । नीचे अछिद्र चट्टानों के होने से पानी बहुत अधिक गहराई तक नहीं जाता, जिससे कुएँ खोदकर सिंचाई और घरेलू काम के लिए पानी का उपयोग करना दकन पठार की एक पुरानी परंपरा है । यही कारण है कि दक्षिण भारत में कुओं की संख्या अधिक है ।

जल-संपत्ति का विकास :

भू-पृष्ठ का पानी नदियों के रास्ते बहकर समुद्र में चला जाता है । वर्षा के पानी का उपयोग ग्रीष्मकाल में होने के लिए इसे अधिक-से-अधिक मात्रा में रोककर जमीन में रिसाने की व्यवस्था होनी चाहिए । कुओं और नलकूपों की संख्या बढ़ती जाने से भूजल-भंडार में कमी होती है । उसे फिर से बढ़ाने के लिए धरती में पानी का रिसाव होना आवश्यक है । यह कार्य एकदम ग्रामस्तर से छोटे पैमाने पर आरंभ होना आवश्यक है । 'पानी रोको, पानी रिसावो' का नारा प्रत्यक्ष व्यवहार में लाना आवश्यक है ।

भू-पृष्ठ के पानी का वाष्पीकरण कम होने के लिए कारगर उपाय करना आवश्यक है । बूँद-सिंचाई और फौवारा-सिंचाई से पानी की बचत होती है । इनका उपयोग सर्वत्र बढ़ने से जल-संपत्ति पर बोझ कम होगा । बड़े-बड़े बाँधवाले क्षेत्रों में नहरों के अक्षम व्यवस्थापन तथा पानी के किए गए अनुचित उपयोग के परिणामस्वरूप पंजाब, उत्तर प्रदेश, राजस्थान आदि राज्यों में मृदा क्षारमय बन चली है । इसे फसल उगाने योग्य बनाना खर्चे का काम है । ऐसी परिस्थिति में जलसंपत्ति का उचित व्यवस्थापन एकमात्र हितकर मार्ग है ।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :
   - क. सतलज नदी .... झील से उद्गमित है ।
   - ख. यमुना नदी .... के समीप आकर गंगा में मिलती है ।
   - ग. तिब्बत में ब्रह्मपुत्र का नाम .... है ।
   - घ. जबलपुर के निकट .... स्थान पर प्रपात है ।
   - ङ. राजस्थान में .... स्थान पर खारे पानी की झील है ।
   - च. उड़ीसा राज्य में .... सबसे बड़ी झील है ।

२. उचित जोड़ियाँ लगाओ :

'अ' समूह (मुख्य नदी)	'आ' समूह (सहायक नदी)
ट. गोदावरी	१. चंबल
ठ. कृष्णा	२. साबरमती
ड. तापी	३. मांजरा
ढ. यमुना	४. तुंगभद्रा
ण. गंगा	५. गिरणा
	६. कोसी

३. एक-एक वाक्य में उत्तर लिखो :
   - त. भारत की सबसे लंबी नदी कौन-सी है ?
   - थ. उत्तर भारत की प्रमुख नदियाँ कहाँ से उद्गमित हैं ?
   - द. वृक्षाकार जलप्रणाली के लिए चट्टानों की रचना कैसी होनी चाहिए ?
   - ध. दकन पठार की अधिकतर नदियाँ किस सागर में मिलती हैं ?
   - न. 'पानी रोको, पानी रिसावो' योजना का प्रमुख उद्देश्य क्या है ?
   - प. महाराष्ट्र में खारे पानी की झील कौन-सी है ?

४. कारण लिखो :
   - य. भारतीय पठारी क्षेत्र में सीमित भूजल-भंडार है ।
   - र. साँभर झील खारे पानी की है ।
   - ल. भारतीय पठार की नदियाँ ग्रीष्मकाल में सूख जाती हैं ।
   - व. पूर्व प्रवाहिनी नदियों ने अपने मुहानों पर डेल्टा क्षेत्र का निर्माण किया है ।
   - श. उत्तर भारत की नदियाँ बारहमासी हैं ।

५. टिप्पणियाँ लिखो :

   १. सतलज नदी, २. अरब सागर में मिलने वाली नदियाँ, ३. भारत की झीलें, ४. जलसंपत्ति का विकास ।

६. भारत की रेखाकृति में निम्नांकित को दर्शाओ और यथास्थान नाम लिखो:

   १. यमुना नदी का उद्गम स्थल, २. मानसरोवर, ३. गंगा नदी, ४. त्र्यंबकेश्वर, ५. कावेरी नदी, ६. चिल्का झील, ७. साँभर झील ।

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अपने परिसर के कुओं का निरीक्षण करो । कुएँ के पानी की सतह में होने वाला परिवर्तन लिखो ।

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प्रकरण ५

मृदासंपत्ति

वनस्पति वृद्धि में मृदा एक महत्वपूर्ण तत्व है। कृषिभूमि का मूल्य मृदा के उपजाऊपन के आधार पर निश्चित होता है। कृषि भारत का अत्यंत प्राचीन व्यवसाय है। यह व्यवसाय यहाँ के लोगों के जीवन का एक अंग बन गया है।

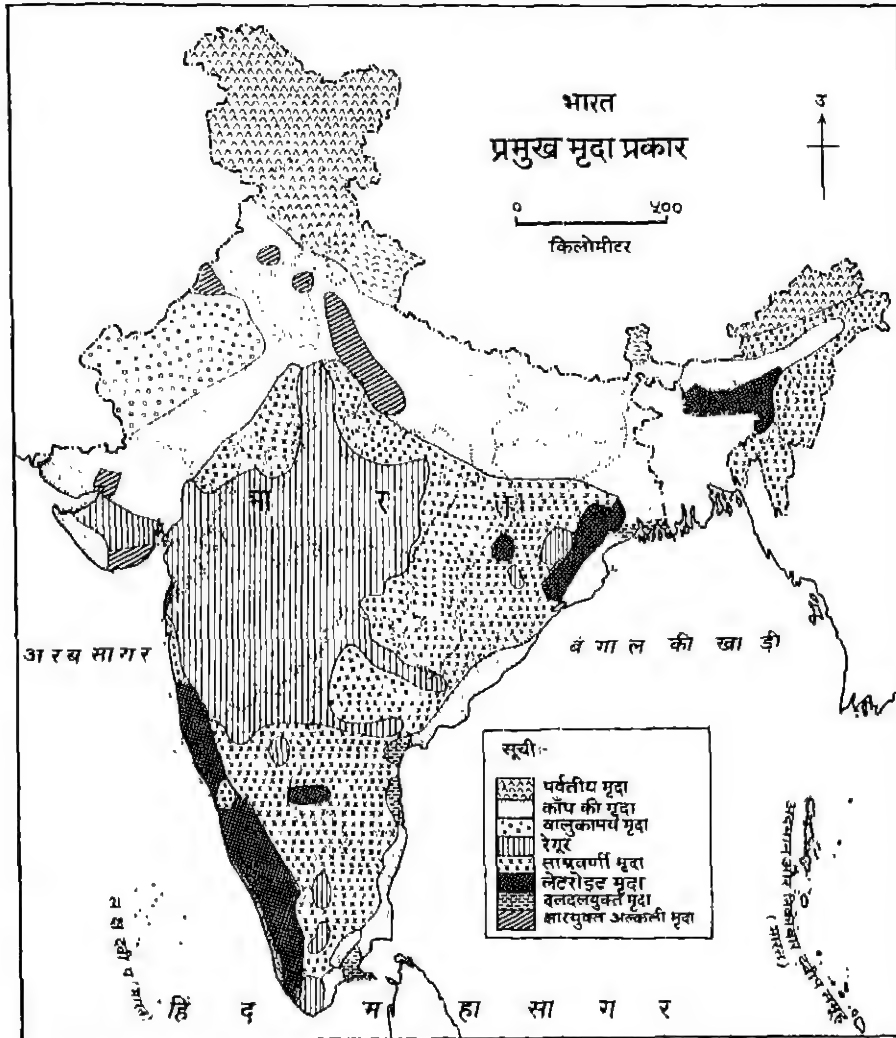
भारत में विविध प्रकार की मृदा मिलती है। मृदा-निर्माण की प्रक्रिया पर प्रमुखतः संबंधित प्रदेश की मूल चट्टानों, जलवायु, वनस्पति, प्राणी जीवन आदि का प्रभाव पड़ता है। अपक्षय क्रिया द्वारा क्षेत्र की चट्टानों का विखंडन होता है। चट्टानों में स्थित खनिज, तैयार हुई मृदा में प्राप्त होते हैं। ऐसी मृदा को असेंद्रीय मृदा कहते हैं। आर्द्र जलवायु में अधिकतर खनिजों पर रासायनिक क्रिया होती है जिससे खनिज घुल जाते हैं। उदाहरणार्थ, कुछ अम्ल कम-अधिक मात्रा में तैयार होते हैं। वनस्पति और प्राणियों के अवशेष मृदा में मिश्रित होने पर सड़ते-गलते अवशेष मृदा के अंश बन जाते हैं। इस सड़े-गले पदार्थ को सेंद्रीय पदार्थ कहते हैं। सेंद्रीय पदार्थों के कारण मृदा का रंग काला होता है और मृदा को उर्वरता प्राप्त होती है।

वनस्पति के लिए मृदा पोषण-पूर्ति का माध्यम है। साथ ही यह वनस्पति को आधार भी देती है। इसी कारण कृषि में मृदा का महत्व है। भारतीय कृषि शोध संस्था ने भारत की मृदा का निम्नांकित रूप में वर्गीकरण किया है। ये प्रकार मानचित्र में दर्शाए गए हैं। इससे मृदा-प्रकारों का वितरण ध्यान में आता है।

मृदा के प्रकार :

१. पर्वतीय मृदा :

पर्वतीय मृदा प्रमुखतः जम्मू-कश्मीर, हिमाचल प्रदेश, उत्तरांचल, सिक्किम, असम तथा अरुणाचल प्रदेश आदि राज्यों के पर्वतीय क्षेत्र में मिलती है। पर्वतीय मृदा का निर्माण हिम, वर्षा, तापमान की भिन्नता आदि के भौतिक अपक्षय द्वारा होता है। पर्वतीय प्रदेशों की तीव्र ढलान और तीव्र गति से बहने वाली जलधारा के कारण भूपृष्ठ पर चट्टानों में हुआ विखंडन अपने स्थान पर अधिक समय तक रुका पड़ा नहीं रहता। वह ढलान की ओर बह चलता है। फलतः मृदा का निर्माण पूर्ण नहीं होता। यह छोटे-बड़े कणों और चट्टानों के



आकृति ५.१ भारत : प्रमुख मृदा प्रकार

टुकड़ों से युक्त होती है । इसे अपरिपक्व अथवा अपूर्ण मृदा कहते हैं । इस मृदा में पानी टिक नहीं पाता । पानी टिका रखने के लिए कणों के आकार का सूक्ष्म तथा चिकनी मिट्‌टीयुक्त होना आवश्यक है । अत: भिन्न भिन्न प्रकार की वृक्ष - फसलें तथा जिन फसलों को पानी निथर जाने वाली मृदा उपयुक्त हो, उनके लिए पर्वतीय मृदा उपयोगी होती है । पहाड़ी ढलानों पर चाय के बगीचे पर्वतीय मृदा में अच्छी तरह विकसित होते हैं ।

२. काँप की मृदा :

भारत का बहुत विस्तृत क्षेत्र काँप की मृदा से व्याप्त है । प्रमुखतः नदियों द्‌वारा बहाकर लाए गए काँप के संचयन से काँप की मृदा तैयार होती है । यही कारण है कि यह मृदा नदियों के कछारी मैदानों में मिलती है । इस मृदा का रंग हलका पीला होता है और इसमें रेत, चिकनी मिट्‌टी तथा सेंद्रीय पदार्थों का मिश्रण रहता है । यह मृदा सूक्ष्म कणों द्‌वारा निर्मित होने के कारण पानी को ग्रहण कर रखती है । इस मृदा में पोटाश और चूने की मात्रा अधिक होती है । उर्वरता की दृष्टि से यह मृदा उत्तम कोटि की होती है । गंगा के कछार में पुराने काँप की भाबर मृदा बाढ़ के मैदानों की अपेक्षा अधिक ऊँचाई के प्रदेशों में मिलती है । इसमें कंकड़-पत्थर की मात्रा अधिक होती है । नए काँप की खादर मृदा नदी तटों पर मिलती है। उत्तर प्रदेश, बिहार, झारखंड और पश्चिम बंगाल आदि राज्यों में काँप की मृदा अधिक मात्रा में पाई जाती है।

आर्थिक दृष्टि से काँप की मृदा विशेष महत्व की है । इस मृदा में गेहूँ, चना, चावल, गन्ना, तंबाकू आदि फसलें उगाई जाती हैं ।

३. बालुकामय मृदा :

बालुकामय मृदा पश्चिमी और मध्य राजस्थान में है । यहाँ के मरुस्थली प्रदेश में उष्ण-शुष्क जलवायु और तापमान में भिन्नता होने के कारण चट्‌टानों का कायिक विखंडन होकर बालू (रेत) का निर्माण होता है । इस बालू को हवा उड़ा ले जाती है, जिसके निक्षेप (संचयन) होने पर मृदा तैयार होती है । इस मृदा में क्षार की मात्रा अधिक होती है । शुष्क जलवायु और वनस्पति के अभाव के कारण इस मृदा में सेंद्रीय घटकों की मात्रा अत्यंत कम होती है । इसकी उर्वरता बढ़ाने के लिए सेंद्रीय खादों का उपयोग करना आवश्यक होता है । पानी की उपलब्धता के अनुसार इस मृदा में कपास, चना, ज्वार, बाजरा, मक्का आदि फसलें उगाई जाती हैं ।

४. रेगूर मृदा :

दकन पठार पर बेसाल्ट के चट्‌टानी प्रदेश में रेगूर मृदा प्राप्त होती है । काँप की मृदा के पश्चात बड़ा क्षेत्र रेगूर मृदा से व्याप्त है । देश में महाराष्ट्र, पश्चिम मध्य प्रदेश, गुजरात राज्य के अधिकतर भाग, कर्नाटक, आंध्र प्रदेश के उत्तरी भाग आदि के पठारी क्षेत्रों में यह मृदा मिलती है ।

रेगूर मृदा में चिकनी मिट्‌टी की मात्रा अधिक होती है । जब यह मृदा गीली रहती है तो बड़ी ही चिपकनी होती है । सूखने पर चिटकती है और बड़ी-बड़ी दरारें पड़ जाती हैं । टिटॅनीफेरस मॅग्नेटाइट के रासायनिक द्रव्य के कारण मृदा को काला रंग प्राप्त हुआ है । इस मृदा में कैलशियम कार्बोनेट, मॅगनेशियम, पोटाश आदि खनिज द्रव्यों की मात्रा अधिक है । लेकिन फास्फोरस और नाइट्रोजन का प्रमाण कम है । चिकनी मिट्‌टी की मात्रा की अधिकता के कारण इसमें नमी को टिका रखने की क्षमता अधिक होती है ।

रेगूर मृदा में कपास की फसल बहुत अच्छी होती है । इसीलिए इसे कपास की काली मिट्‌टी भी कहते हैं । कपास के साथ-साथ विविध प्रकार की दलहन फसलें, ज्वार, गेहूँ, गन्ना आदि का भी उत्पादन इस मृदा में अच्छा होता है ।

५. ताम्रवर्णी मृदा :

यह मृदा प्रमुखतः तमिलनाडु, कर्नाटक, गोआ, पूर्वी आंध्र प्रदेश, उड़ीसा, और छोटा नागपुर के पठार आदि क्षेत्रों में मिलती है । इसका निर्माण अति प्राचीन रूपांतरित चट्‌टानों से होकर अधिक वर्षा वाले प्रदेशों में हुआ है । इस मृदा में लौह यौगिक अधिक होने के कारण यह ताम्रवर्णी (ताँबे के रंग की) होती है । पहाड़ियों के ढलानों पर इस मृदा की मोटाई कम और मैदानी भागों में अधिक होती है । ताम्रवर्णी मृदा कम उर्वर होती है; किंतु नियमित खाद की पूर्ति से यह उत्पादनक्षम होती है । इस मृदा में चावल, गन्ना, कपास, मूँगफली आदि फसलें उगाई जाती हैं ।

६. जांभी मृदा (लेटेराइट मृदा) :

अदल-बदलकर निरंतर आर्द्र और शुष्क कालावधि वाले अधिक वर्षा के उष्ण क्षेत्रों में जांभी मृदा (लेटराइट मृदा) विकसित होती है । पानी के निथरते समय चूना और सिलिका की मात्रा में कमी होती जाती है । लोहा और अल्युमिनियम के यौगिकों की मात्रा अधिक बचती है । अतः इस मृदा का रंग लाल होता है । इस मृदा में नाइट्रोजन, पोटेशियम तथा जैविक (सेंद्रिय) द्रव्यों की मात्रा नितांत नगण्य होने के कारण यह मृदा कृषि के लिए अनुपयोगी होती है । दक्षिण महाराष्ट्र, गोआ, कर्नाटक, केरल, असम और उड़ीसा राज्य के कुछ क्षेत्रों में जांभी मृदा मिलती है। इस मृदा में काजू, काफी, चाय आदि फसलें उगाई जाती हैं।

७. दलदलयुक्त मृदा :

सदा पानी के संपर्क में रहने के कारण समुद्री किनारों के निकटवर्ती क्षेत्रों में इस मृदा का निर्माण होता है । इसमें लोहे तथा जैविक तत्वों की मात्रा अधिक होती है । पश्चिम बंगाल के सुंदरबन प्रदेश, उड़ीसा, आंध्र प्रदेश, तमिलनाडु की तटीय पट्‌टी तथा उत्तर प्रदेश के तराई क्षेत्र में यह मृदा प्रमुख रूप से मिलती है । पटसन की फसल उगाने के लिए यह बड़ी उपयुक्त होती है ।

८. क्षारयुक्त मृदा तथा अल्कली मृदा :

जिस मृदा में क्षार की मात्रा अधिक होती है, उसे क्षारयुक्त मृदा कहते हैं । पानी का निथार न होने से भूमि दलदलयुक्त बनती है । उसी समय भूपृष्ठ के नीचेवाली मृदा के क्षार घुलते हैं । पानी का वाष्पीकरण होते समय केशिकाकर्षण क्रिया द्‌वारा क्षार भूपृष्ठ की ओर आते हैं, जिससे क्षारयुक्त मृदा का निर्माण होता है । समुद्रतट से लगे हुए निचले प्रदेशों में ज्वार का पानी संचित रहने से वहाँ की मृदा क्षारयुक्त हो जाती है ।

जहाँ पानी का अनियंत्रित उपयोग हो रहा है, वहाँ इस प्रकार की मृदा का क्षेत्र बढ़ रहा है । पंजाब, हरियाणा और पश्चिमी उत्तर

प्रदेश में इस प्रकार के क्षेत्र बहुत विस्तृत रूप में मिलते हैं। यह अनुपजाऊ मृदा है। इसमें कृषि करने के लिए बड़ी मात्रा में जैविक खाद का उपयोग करना आवश्यक होता है।

मृदा का क्षरण और संधारण :

मृदा के कणों को वनस्पतियों की जड़ें पकड़कर रखती हैं। वनस्पतियों के कारण बहते पानी को रुकावट निर्माण होती है; जिससे मृदा बहने से बच जाती है। वनस्पतियों के आच्छादन के कारण वर्षा का आघात सीधे मृदा पर नहीं होता, इसलिए वह टिकी रहती है। *इससे यह स्पष्ट होता है कि वनस्पतियाँ मृदा का क्षरण नहीं होने देतीं।*

भारत में मृदा क्षरण के प्रमुख कारण हैं– वनों का विनाश, भूपृष्ठ की ढलान, अल्पकाल में केंद्रित अधिक तीव्रता से होने वाली वर्षा और अनियंत्रित पशुचारण। मृदा-क्षरण भारतीय कृषि की एक महत्व पूर्ण समस्या है। भारत के प्राय: सभी राज्यों में वनों की अंधाधुंध कटाई होने से मृदा-क्षरण की समस्या का निर्माण हुआ है।

पानी के बहने से होने वाला क्षरण पर्वतीय प्रदेशों, नदी-घाटियों तथा समुद्र तटवर्ती क्षेत्रों में मिलता है। नदियों में बाढ़ आने पर बहुत बड़ी मात्रा में मृदा बहा ले जाई जाती है। समुद्र तटवर्ती प्रदेशों में लहरों के टकराने से तटीय क्षेत्रों में क्षरण होता है। समुद्र का पानी भूप्रदेशों में प्रवेश करता है, जिससे भूमि क्षारयुक्त हो जाती है। गुजरात, महाराष्ट्र, केरल आदि के तटवर्ती भागों में क्षारीय भूमि का क्षेत्र बढ़ रहा है।

भारतीय महामरुस्थल के सीमावर्ती भागों में मूलरूप से शुष्क जलवायु, वनस्पतियों का विनाश तथा हवा के प्रभावपूर्ण कार्य के कारण समीपस्थ पंजाब और पश्चिमी उत्तर प्रदेश की ओर मरुस्थल का अतिक्रमण हो रहा है।

मृदा की उत्पादकता को बनाए रखने के लिए मृदा का संधारण (संरक्षण-संवर्धन) अत्यावश्यक है। भिन्न-भिन्न प्रदेशों की कृषिपद्धति में उचित परिवर्तन करके संधारण करना संभव है। तीव्र ढलान वाले क्षेत्रों में कृषिकार्य टालना चाहिए और वनस्पतियाँ *उगाई जानी चाहिए। ढलान वाले क्षेत्रों में कृषि करने के लिए* सीढ़ीनुमा खेतों की रचना एक उपाय है। ऊँचे पहाड़ी भागों में वन लगाना आवश्यक है; क्योंकि यहाँ से बहकर आने वाले पानी के गति में कमी हुई, तो मैदानी भाग में भी मृदा का क्षरण नहीं होगा।

खुले पशु-चारण पर रोक लगाना और पशु-चराई के लिए क्षेत्र निश्चित करना भी मृदा-संधारण का एक महत्वपूर्ण उपाय है। संक्षेप में, भूमि के उपयोग का नियोजन करना तथा भूमि को दुरुपयोग से बचाना आवश्यक है।

मृदा संधारण के लिए सरकार ने मेंड-बंदी के अतिरिक्त सामाजिक वनीकरण का कार्यक्रम अपनाया है। भारत में मृदा शोध के अंतर्गत विविध शोध संस्थाएँ कार्यरत हैं। वे मृदा-संधारण की विविध उपाय योजनाओं का सुझाव देती हैं। मृदा-संधारण संबंधी राष्ट्रीय स्तर के कार्यक्रमों में जनता का सहयोग होना अत्यावश्यक है।

स्वाध्याय

(अ)

१. रिक्त स्थान में उचित शब्द लिखो :
   - क. चाय के बगीचे के लिए .... प्रकार की मृदा अच्छी होती है।
   - ख. बालुकामय मृदा में .... मात्रा अधिक होती है।
   - ग. कपास की काली मृदा .... नाम से जानी जाती है।
   - घ. सदैव पानी के संपर्क में रहने के कारण समुद्रतट के समीपवर्ती क्षेत्रों में .... मृदा का विकास होता है।

२. उचित जोड़ियाँ लगाओ :

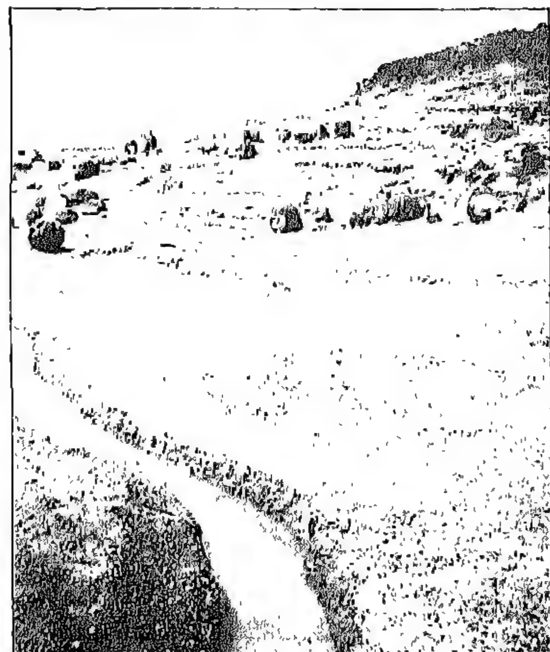
'क' समूह (मृदा)	'ख' समूह (फसलें)
च. पर्वतीय मृदा	१. पटसन
छ. कॉप की मृदा	२. चावल
ज. रेगुर मृदा	३. कपास
झ. जांभी मृदा	४. बाजरा
ञ. दलदलयुक्त मृदा	५. काजू
	६. चाय

३. कारण लिखो :
   - ट. पर्वतीय मृदा अपरिपक्व मृदा है।
   - ठ. रेगुर मृदा में आर्द्रता टिका रखने की क्षमता होती है।
   - ड. जांभी मृदा का रंग लाल होता है।
   - ढ. पंजाब में मरुस्थल का अतिक्रमण हो रहा है।

४. भारत की रेखाकृति में निम्नांकित बातें दर्शाकर उनके नाम लिखो :
   - १. पर्वतीय मृदा
   - २. रेगुर मृदा
   - ३. बालुकामय मृदा

(आ)

अपने परिसर की मृदा का नमूना इकट्ठा करो। यह मृदा किस प्रकार में समाविष्ट की जा सकती है, इसे अध्यापक की सहायता से निश्चित करो।



पानी रोको, पानी रिसाओ

प्रकरण ६

वनसंपत्ति

वन देश की अत्यंत महत्वपूर्ण प्राकृतिक संपत्ति है। वनों की कटाई होने पर भी कुछ ही वर्षों में वे फिर बढ़ जाते हैं। अत: वन पुनः निर्माण होने वाली संपत्ति है।

वन उत्पादक और संरक्षक के रूप में दो महत्वपूर्ण कार्य संपादित करते हैं। ये हमें इमारती लकड़ी, जलाऊ लकड़ी, असंख्य उपयोगी वस्तुएँ और पदार्थ तथा पशुओं के लिए चारे की पूर्ति करते हैं। ये इनके उत्पादक कार्य हैं। वन धरती पर चलने वाली हवाओं तथा बहने वाले पानी के वेग को कम करते हैं। इससे मृदा का क्षरण कम होता है। वन, भूमि में पानी रिसने में सहायता करते हैं। साथ ही बाढ़ पर नियंत्रण करते हैं। सबसे महत्व की बात तो यह है कि वन पर्यावरण की गुणवत्ता सुधारने में प्रमुख भूमिका निभाते हैं। ये वन के संरक्षक कार्य हैं। राष्ट्रीय वन-नीति के अनुसार वनीकरण और वन-संरक्षण,दोनों को महत्व दिया गया है। ऐसा होने पर ही पर्यावरण स्थिर रह सकेगा और पारिस्थितिकीय संतुलन बना रहेगा।

वनों का भौगोलिक वितरण :

इस समय देश के कुल भौगोलिक क्षेत्रफल का लगभग २३% वनों से आच्छादित है। इसमें से सघन वनों का क्षेत्र कम और वनस्पति के विरल आच्छादन का क्षेत्र अधिक है।

वनों के वितरण पर प्रमुख रूप से वर्षा, भूपृष्ठ रचना, कृषि, जनसंख्या की सघनता आदि घटकों का प्रभाव पड़ता है। भारत में वन-क्षेत्रों का वितरण मानचित्र में दर्शाया गया है। इससे, देश के किस भाग में कितना वन क्षेत्र है –स्पष्ट हो जाता है।

अधिक वर्षावाली हिमालय की पर्वत श्रेणियाँ, तलहटी के क्षेत्र, उत्तर-पूर्वी पहाड़ी प्रदेश, पश्चिमीघाट, विंध्य-सतपुड़ा की श्रेणियाँ आदि क्षेत्रों में सघन वन पाए जाते हैं। इसके विपरीत कम वर्षा वाले राजस्थान और गुजरात राज्यों में तथा भारतीय पठार के वृष्टिछाया वाले क्षेत्रों में वन नितांत कम हैं। गंगा के मैदानी क्षेत्रों में जहाँ खेती की जाती है और मानव बस्ती घनी है, वहाँ वनक्षेत्र कम मिलते हैं। यही स्थिति कृषिप्रधान महाराष्ट्र, पश्चिम बंगाल, कर्नाटक और तमिलनाडु राज्यों में भी है। इससे भारत में वनों का असमान वितरण होना स्पष्ट होता है।

वनों के प्रकार :

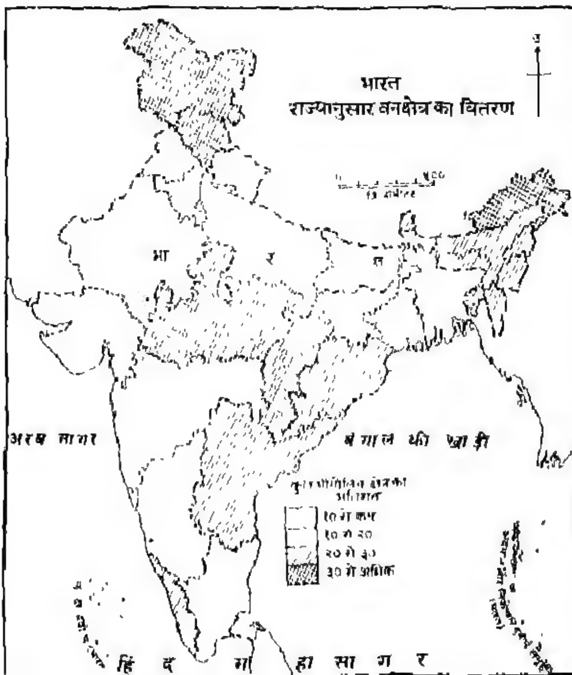
वनों की वृद्धि पर वर्षा की मात्रा और वितरण का प्रभाव पड़ता है। वर्ष में अधिक समय तक अधिक वर्षा पाने वाले प्रदेशों में वन खूब हरे-भरे और सघन होते हैं। थोड़े समय तक अधिक वर्षा पाने वाले क्षेत्रों में वन तो मिलते हैं ; किंतु ग्रीष्मकाल में उनके वृक्षों की पत्तियाँ झड़ जाती हैं। कम तथा अनिश्चित स्वरूप की वर्षा वाले प्रदेशों में कँटीली झाड़ियाँ होती हैं। वनों के प्रकार से वर्षा के वितरण का भी अनुमान होता है। भारतीय वनों के निम्नांकित प्रमुख प्रकार होते हैं :

१. उष्ण प्रदेशीय सदाबहार वन

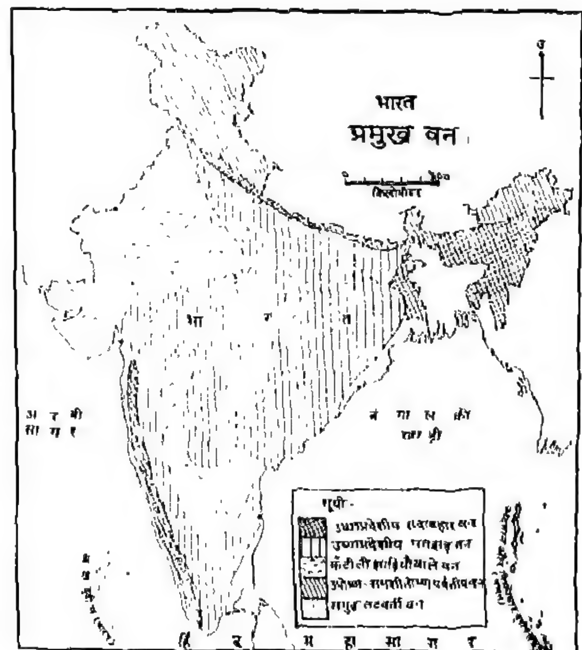
२. उष्ण प्रदेशीय पतझड़ के वन

३. कँटीली झाड़ियोंवाले वन

४. उपोष्ण तथा समशीतोष्ण पर्वतीय वन



आकृति ६.१ भारत : वनक्षेत्र का वितरण



आकृति ६.२ भारत : वनों के प्रकार

५. समुद्र तटवर्ती वन

१. उष्ण प्रदेशीय सदाबहार वन :

ये वन ९०० मी. से अधिक ऊँचाईवाले और २५० सेंमी अथवा उससे अधिक वर्षावाले प्रदेशों में मिलते हैं। पानी की सदा उपलब्धतावाले क्षेत्रों में सदाबहार वन पाए जाते हैं । ये वन सघन होते हैं और इनके वृक्षों की ऊँचाई ५० मी. तक मिलती है । इन वनों में रोजवुड, एबोनी, रबर, शीसम, बाँस, बेंत आदि वृक्ष मिलते हैं। सदाबहार वन हिमालय की तलहटी, पश्चिमीघाट और पूर्वघाट की ढलानों पर, असम के पहाड़ी क्षेत्रों में तथा अंदमान-निकोबार द्वीपों में हैं।

२. उष्ण प्रदेशीय पतझड़ के वन :

लगभग २०० सेमी. तक वर्षावाले भागों में चौड़ी पत्तीवाले वन पाए जाते हैं । ग्रीष्मकाल में हवा की आर्द्रता कम होने लगने पर यहाँ के वृक्ष वाष्पीकरण कम होने के लिए अपनी पत्तियाँ गिरा देते हैं परिणामतः उष्ण-शुष्क हवा में टिके रहते हैं । इन वनों में साल, सागौन, पलाश, अर्जुन, महुआ, पीपल, चंदन, बाँस आदि के पेड़ मिलते हैं। मध्य प्रदेश, छत्तीसगढ़, बिहार, झारखंड, उड़ीसा, महाराष्ट्र, केरल आदि राज्यों में इस प्रकार के वन पाए जाते हैं। ये वन आर्थिक दृष्टि से बड़े महत्व के हैं।

३. कँटीली झाड़ियोंवाले वन :

ये वन ७५ सेमी. से कम वर्षा वाले क्षेत्रों में होते हैं । कम वर्षा के कारण यहाँ के वृक्ष अधिक ऊँचे नहीं बढ़ सकते । इन वनों के वृक्षों के पत्ते कम चौड़े और लंबे आकार के होते हैं । साथ ही ये पेड़ कँटीले होते हैं । विविध प्रकार के बबूल, कैक्टस तथा अन्य कँटीली झाड़ियाँ और छोटी-छोटी घास विरल स्वरूप में यहाँ होती है । वनस्पति का अखंड आवरण नहीं मिलता । कच्छ-सौराष्ट्र के कुछ भाग, राजस्थान, पंजाब, हरियाणा और महाराष्ट्र के कम वर्षावाले क्षेत्रों में ऐसे वन मिलते हैं ।

४. उपोष्ण और समशीतोष्ण पर्वतीय वन

भारत के उत्तर में ऊँचे पर्वतीय क्षेत्रों में तापमान कम रहता है । फिर भी वर्षा की मात्रा लगभग १२० सेमी. होती है । १२० सेमी. से अधिक वर्षा वाले ऊँचे पर्वतीय भागों में समशीतोष्ण वन मिलते हैं । यहाँ के वनों की लकड़ी कोमल और वजन में हलकी होती है। लगभग १२०० से ३५०० मी. ऊँचाई तक तथा उससे अधिक ऊँचाई पर पाइन, स्प्रूस, देवदार, फर, पापलर, बर्च और मेपल जैसे वृक्ष पाए जाते हैं। ये वन सघन हैं; किंतु वृक्ष-कटाई का हानिकारक प्रभाव यहाँ के वनों पर स्पष्ट रूप से दिखाई पड़ने लगा है। ऐसे वन प्रमुखतः हिमालय के पर्वतीय क्षेत्रों में होते हैं। इन वनों में सेव, अखरोट, चेरी जैसे फलवाले समशीतोष्ण प्रदेशीय पेड़ मिलते हैं।

५. समुद्र तटवर्ती वन :

समुद्र किनारों के दलदली क्षेत्रों में तथा डेल्टाई प्रदेशों में वनों की अच्छी वृद्धि होती है । ये वन सघन होते हैं और इनके कुछ वृक्षों की ऊँचाई ३० मी. तक होती है । गंगा के डेल्टाई क्षेत्र के वनों में सुंदरी वृक्षों की संख्या अधिक होने के कारण यहाँ के वन सुंदरवन के नाम से जाने जाते हैं । ऐसे वन प्रमुख रूप से पश्चिम बंगाल, उड़ीसा, आंध्र प्रदेश, तमिलनाडु आदि राज्यों के तटवर्ती क्षेत्रों में पाए जाते हैं । यहाँ के वृक्षों का उपयोग सुगंधित तेल, इत्र, कागज-निर्माण आदि उद्योगों में किया जाता है ।

वन-उपज तथा उनका आर्थिक महत्व :

इनके अतिरिक्त वन-उपज में लाख, राल, गोंद, औषधि, शहद, महुआ, तरह-तरह की घास, बेंत, बाँस आदि असंख्य वस्तुएँ आती हैं । भारत के ग्रामीण क्षेत्रों में ईंधन के रूप में वनों की लकड़ी तथा वनस्पतियों के टूटे-पड़े भाग बड़ी मात्रा में काम आते है; क्योंकि ग्रामीण क्षेत्रों में अन्य प्रकार के ईंधन की उपलब्धता बहुत कम है । किसानों के कृषि संबंधी परंपरागत सभी औजार-हथियार विविध प्रकार की लकड़ी से ही बनाए जाते हैं ।

वन के वृक्षों पर एक विशेष प्रकार के कीड़े से लाख प्राप्त होती है। बिहार, झारखंड, उड़ीसा, मध्य प्रदेश, छत्तीसगढ़ आदि राज्यों में लाख का उत्पादन होता है। लाख का उपयोग औषधियाँ, रंग, ग्रामोफोन रेकॉर्ड, चूड़ी आदि अनेक उद्योगों मे होता है। बबूल की छाल औषधि के लिए उपयोगी है। मध्य प्रदेश, छत्तीसगढ़, असम, केरल, तमिलनाडु आदि राज्यों के वनों में दियासलाई और प्लाईवुड में लगने वाली मुलायम लकड़ी मिलती है । हिमालय के पर्वतीय क्षेत्रों में मिलने वाली मुलायम लकड़ी, घास और बाँस का उपयोग कागज बनाने में किया जाता है । खेल के सामान और पैकिंग के बक्से तैयार करने के लिए इसी प्रकार की लकड़ी उपयोग में लाई जाती है ।

प्रमुख प्रकार की लकड़ी के उत्पादक राज्य और उनकी लकड़ी की उपयोगिता

लकड़ी के प्रकार	राज्य	उपयोगिता
१. सागौन	तमिलनाडु, महाराष्ट्र, पश्चिम बंगाल, मध्य प्रदेश, छत्तीसगढ़	इमारती, फर्नीचर, जहाज बनाना, रेल्वे स्लीपर बनाने में
२. देवदार	अरूणाचल प्रदेश, हिमाचल प्रदेश	फर्नीचर, कारीगरी की वस्तुएँ
३. साल	उड़ीसा, बिहार, झारखंड, प.बंगाल, मध्य प्रदेश, छत्तीसगढ़, कर्नाटक	इमारती, रेल्वे स्लीपर, जहाज बनाना
४. शीसम	तमिलनाडु, महाराष्ट्र, मध्य प्रदेश, छत्तीसगढ़	फर्नीचर, कारीगरी की वस्तुएँ
५. चंदन	कर्नाटक	चंदन तेल, औषधि, कारीगरी की वस्तुएँ
६. हलदू	मध्य प्रदेश, छत्तीसगढ़, महाराष्ट्र, उड़ीसा, आंध्र प्रदेश	फर्नीचर (मेज-कुर्सी आदि)
७. सुंदरी	पश्चिम बंगाल	कागज-निर्माण, नावें बनाना, इमारती काम
८. कत्था	राजस्थान, कर्नाटक, महाराष्ट्र, बिहार, झारखंड	कत्था बनाना, चमड़ा कमाना

उपयोग में आने वाली लकड़ी भारत के इन वनों में मिलती है। सागौन, देवदार, साल, शीसम, चंदन, सुंदरी, हलदू, कत्था आदि वृक्षों का समावेश इनमें होता है। कुछ प्रमुख प्रकार की लकड़ी के उत्पादक राज्य और उनकी लकड़ी की उपयोगिता आगे की सारिणी में दर्शाई गई है।

भारत जैसे उष्ण देश में तापमान सौम्य होने तथा आर्द्रता की मात्रा में वद्धि होने के लिए वनों से सहायता मिलती है। इसके लिए कुछ भौगोलिक क्षेत्र के ३३% क्षेत्र पर सघन वनों का आच्छादन नितांत आवश्यक है। वनप्रदेश सृष्टि सौंदर्य से समृद्ध होते हैं और पर्यटकों को आकर्षित करते हैं।

विगत चालीस वर्षों में नगरों, उद्योग-धंधों, जनसंख्या आदि में वृद्धि होने के कारण वन-उत्पादन पर बहुत अधिक दबाव पड़ा है। व्यक्तिगत स्वार्थ पूर्ति के लिए वनों का अत्यधिक विनाश हुआ है। भारत के वनों का बड़ी तेजी से होता विनाश गंभीर चिंता का विषय है। वन-क्षेत्रों में कमी होने से मृदा-क्षरण और बाढ़ की मात्रा में वृद्धि हुई, प्रदेश उजाड़ हुए, वर्षा की मात्रा में कमी हुई तथा पारिस्थितिक असंतुलन की समस्या खड़ी हुई। अत: वनों के लाभ तथा उनके अभाव में होने वाले दुष्परिणाम के संबंध में जनचेतना को जागृत करने की अत्यंत आवश्यकता है।

वन-संधारण (रक्षण-संवर्धन):

वनस्पति का पुनर्निर्माण संभव तो है; किंतु इसमें समय लगता है। मनुष्य द्वारा वनसंपत्ति के उपयोग के कारण वनस्पतियों की कुछ प्रजातियों के विनष्ट हो जाने का धोखा निर्माण हो गया है। अत: पारिस्थितिक संतुलन को प्रधानता देकर वनों का संधारण करना युग की माँग है।

वन-संधारण के लिए सरकारी स्तर पर विविध उपाय किए जा रहे हैं। इनमें कानून से वृक्ष-काटने पर रोक, वनों की वृद्धि के लिए उपाययोजन-नीति, वनक्षेत्रों में वृक्षारोपण, वन-कृषि आदि का समावेश है। पर्यावरण से प्रेम करने वाले लोग जनजागरण के माध्यम से विविध प्रकार के आंदोलन में सहायता कर रहे हैं।

सामाजिक वनीकरण विभाग ने सार्वजनिक तथा निजी खाली जगहों में सभी के सहयोग से वृक्ष लगाने का कार्यक्रम अपनाया है। पौधे तैयार करके उनके लगाने का काम वर्षाकाल के प्रारंभ में सड़कों, रेल-लाइनों, नहरों के किनारे, शैक्षणिक परिसरों, ऊसरों, पठारों, पहाड़ियों आदि पर किया जाता है। यह कार्यक्रम धीरे-धीरे सफल होने लगा है और इसमें जनता के साथ-साथ विद्यार्थियों का भी अच्छा सक्रिय सहयोग मिल रहा है।

वन्य प्राणी :

भारत के सघन वनों में समृद्ध प्राणी-जीवन मिलता है। यह समृद्धता जलवायु और वनस्पति की विविधता के कारण है। हाथी, बाघ, सिंह, हिरन, साँभर, खरगोस, गेंडा, मगरमच्छ, घड़ियाल, साँप, बंदर आदि प्रमुख प्राणी हैं। पक्षियों में प्रमुख मोर, कबूतर, गरुड, बाज, गौरैया, कोयल, तीतर, कौवा, तोता आदि हैं। ये सभी पशु-पक्षी कम या अधिक संख्या में भारत में मिलते हैं किंतु कुछ प्राणियों के अपने विशेष क्षेत्र भी हैं।

भारतीय वनों में हाथी एक महत्वपूर्ण प्राणी है। यह असम, केरल और कर्नाटक में मिलता है। राजस्थान के मरुस्थली भागों में ऊँट और जंगली गधे पाए जाते हैं। गेंडा असम और पश्चिम बंगाल में दीख पड़ता है। सिंह सौराष्ट्र के गिर वन में पाया जाता है। सुंदरबन में बाघ पाए जाते हैं। लकड़बग्घा, तेंदुआ आदि प्राणी कुछ भागों में मिलते हैं।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :
   - क. भारत में .... प्रतिशत क्षेत्र वनों से व्याप्त है।
   - ख. कैक्टस .... वन का पौधा है।
   - ग. गंगा के डेल्टाई क्षेत्र में .... वृक्षों की संख्या अधिक है।

२. उचित जोड़ियाँ लगाओ :

'क' समूह (वन)	'ख' समूह (वृक्ष)
च. सदाबहार वन	१. सागौन
छ. उष्ण प्रदेशीय पतझड़	२. कैक्टस
ज. कँटीले वन	३. पापलर
झ. समशीतोष्ण पर्वतीय वन	४. सुंदरी
ञ. समुद्र तटवर्ती वन	५. महोगनी

३. कारण लिखो :
   - ट. भारत में पतझड़ के वन मिलते हैं।
   - ठ. वनसंपत्ति पुनर्निर्माण होने वाली संपत्ति है।
   - ड. चौड़ी पत्तीवाले पतझड़ वन आर्थिक दृष्टि से महत्वपूर्ण हैं।
   - ढ. वनों की कटाई बड़े पैमाने पर हुई है।

४. टिप्पणियाँ लिखो :
   - त. भारत के वनों की उपज
   - थ. वनों से लाभ
   - द. वन-संधारण

५. निम्नांकित प्रश्नों के उत्तर लिखो :
   - प. भारतीय वनों का महत्व बताओ।
   - फ. वन-उत्पादन का आर्थिक महत्व लिखो।
   - ब. वनों की कटाई का दुष्परिणाम लिखो।

६. भारत की रेखाकृति में निम्नांकित को दर्शाकर यथास्थान उनके नाम लिखो :
   - १. सुंदरवन
   - २. दक्षिणी भारत के कँटीले वन
   - ३. ऊँट के झुंडवाले प्रदेश

(आ)

किसी वन-क्षेत्र में जाकर निरीक्षण करो और निम्नांकित के विषय में जानकारी लिखो : वृक्षों के प्रकार, वृक्षों के नाम, पत्तों के आकार, पेड़ों की ऊँचाई।

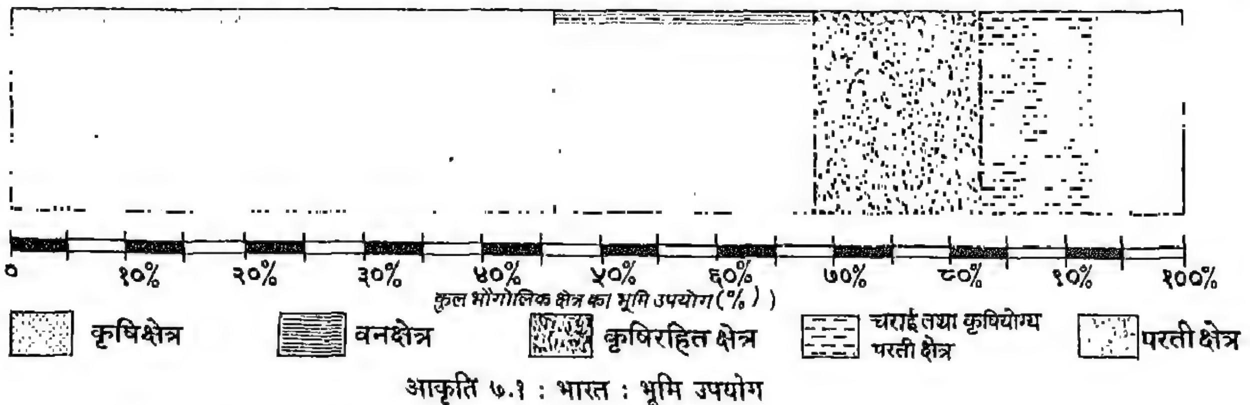
प्रकरण ७

भूमि उपयोग और कृषि विकास

भारत में कृषि-व्यवसाय पुरातन काल से किया जा रहा है। आज भी भारत की अर्थव्यवस्था प्रमुखतः कृषि पर निर्भर है। देश की कुल जनसंख्या के लगभग ७०% लोग प्रत्यक्ष या परोक्ष रूप से कृषि-व्यवसाय पर अवलंबित हैं। इस प्रकरण में हम भारतीय भूमि के उपयोग तथा भारतीय कृषि के विकास का अध्ययन करेंगे।

भूमि-उपयोग :

मानव जिस भूमि पर रहता है, उस भूमि के विविध गुणधर्मों (विशेषताओं) पर उसका व्यवसाय निर्भर होता है। भूमि खनिजयुक्त हो, तो खान खोदने का व्यवसाय चुना जाता है। उर्वर, समतल हो और जलवायु फसलों के अनुकूल हो, तो वहाँ खेती की जाती है। घास का क्षेत्र हो, तो पशु-चारण व्यवसाय चलता है। भारतीय भूमि के उपयोग की विशेषताओं को ध्यान में रखकर उसे पाँच प्रमुख प्रकारों में वर्गीकृत किया जाता है।



आकृति ७.१ : भारत : भूमि उपयोग

१. वन-क्षेत्र :

इसके अंतर्गत देश के सभी प्रकार के वनों की भूमि का समावेश होता है। देश के कुल भौगोलिक क्षेत्र का लगभग २३% क्षेत्र वनों से घिरा है। सामान्यतः अधिक ऊँचाई, पर्वतीय तथा अधिक वर्षा वाले क्षेत्रों में सघन वन हैं। अन्य क्षेत्रों में वर्षा की मात्रा के अनुसार कम या अधिक वन मिलते हैं। देश में ३३% से कम वनक्षेत्र होना पारिस्थितिक संतुलन की दृष्टि से चिंता का विषय है।

२. कृषिरहित - क्षेत्र :

कृषिरहित क्षेत्र के अंतर्गत सड़क, रेलमार्ग, बस्ती, जलाशय आदि का समावेश होता है। साथ ही, उजाड़, ऊबड़- खाबड़, कृषि अयोग्य आदि क्षेत्र भी इसमें आते हैं। देश के लगभग १३% क्षेत्र का इसमें अंतर्भाव है। देश में होने वाले औद्योगिक विकास के कारण सड़कों तथा बस्तियों के लिए भूमि का उपयोग बढ़ता चला है।

३. चराई तथा कृषियोग्य परती क्षेत्र :

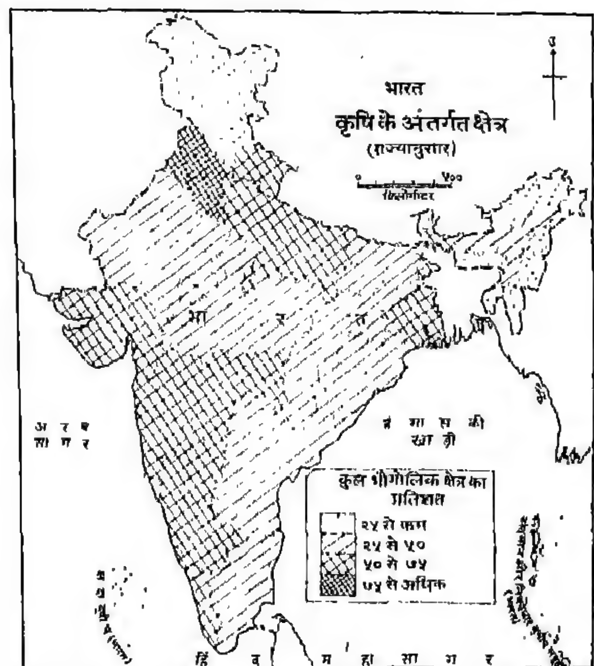
देश में स्थायी स्वरूप की घास कम मिलती है। फिर भी जो मिलती है, उसका स्थायी क्षेत्र, विरल, बिखरे, झाड़-झंखाड़वाले क्षेत्र, तथा कृषियोग्य होते हुए भी वर्तमान में कृषिरहित क्षेत्र आदि का समावेश इस वर्ग में होता है। देश का लगभग १०% भूक्षेत्र इसके अंतर्गत आता है।

४. परती क्षेत्र :

जब किसी समय तक भूमि कृषि अंतर्गत थी; किंतु वर्तमान में यह कृषि उपयोग में नहीं ली जाती, तो ऐसी भूमि को परती क्षेत्र कहा जाता है। कुछ किसान मृदा की उर्वरता को बनाए रखने के लिए प्रति एक, दो वर्ष के अंतर से कृषिभूमि को परती रखते हैं। देश में परती भूमि का क्षेत्र ८% है। प्रयत्न करने पर यह भूमि कृषि के अंतर्गत लाई जा सकेगी।

५. कृषि-क्षेत्र :

देश की कुल भूमि का लगभग ४६% क्षेत्र कृषि के अंतर्गत



आकृति ७.२ :भारत : कृषि के अंतर्गत क्षेत्र

आता है । भारत में कृषि-क्षेत्र का भौगोलिक वितरण अत्यंत असमान मिलता है ।

कृषि-अंतर्गत क्षेत्र दर्शाने वाले मानचित्र से ऐसा स्पष्ट होता है कि पंजाब और हरियाणा राज्यों में सबसे अधिक कृषि भूक्षेत्र है । पश्चिम बंगाल, महाराष्ट्र, उत्तर प्रदेश, केरल, कर्नाटक, गुजरात आदि राज्यों में भी औसत की अपेक्षा अधिक भूक्षेत्र कृषि के अंतर्गत है । सिक्किम, मेघालय, नागालैंड, मणिपुर, जम्मू-कश्मीर, हिमाचल प्रदेश और उत्तरांचल आदि के पहाड़ी क्षेत्रों में कृषि के अंतर्गत बहुत ही कम क्षेत्र है ।

स्वतंत्रता के बाद भूमि-उपयोग में नियोजन द्वारा परिवर्तन लाया जा रहा है । अधिक-से-अधिक भूमि कृषि-कार्य में कैसे लाई जा सकती है - इसके लिए प्रयत्न किए गए हैं । फलतः कृषि-क्षेत्र में थोड़ी वृद्धि हुई है । साथ ही, वन-क्षेत्र में वृद्धि के प्रयत्न प्रारंभ हैं ।

देश में कृषि के क्षेत्र में वृद्धि का अवसर आज कम है ; क्योंकि वर्तमान वन-क्षेत्र को कम नहीं किया जा सकता । इसके अलावा कुछ क्षेत्रों में प्राकृतिक रचना और जलवायु की प्रतिकूलता के कारण कृषि-क्षेत्र की वृद्धि पर रुकावट आ गई है । ऐसी स्थिति में अब हमारे पास केवल एक ही उपाय शेष रहा है कि जितना कृषि-भूक्षेत्र है, उसी पर सुधारित कृषि पद्धति का उपयोग करके उत्पादन बढ़ाया जाए ।

देश की अत्याधिक जनसंख्या को ध्यान में रखते हुए, बढ़ती हुई जनसंख्या के लिए खाद्यान्न की पूर्ति करना कृषि का प्रमुख उद्देश्य है । इसके साथ ही उद्योगों के लिए कच्चे माल की पूर्ति तथा निर्यात के लिए माल उपलब्ध करा देना भी महत्वपूर्ण उद्देश्य है ।

भारतीय कृषि की प्रमुख विशेषताएँ :

१. कृषि भारत का प्राचीन व्यवसाय है । जीवनयापन के लिए खेती करना इसकी प्रमुख विशेषता है । इसके अंतर्गत किसान प्रमुखतः अपने परिवार के लिए उत्पादन करता है और उसमें से कुछ शेष रह जाने पर उसकी बिक्री करता है ।

२. भारत में जिरायती और बागायती दोनों प्रकार की खेती की जाती है । वर्षा पर आधारित खेती जिरायती खेती और सिंचाई से साग-भाजी, फल आदि की खेती बागायती खेती होती है ।

३. हमारी खेती मानसूनी वर्षा पर निर्भर है । देश की फसलों का प्रकार वर्षा की मात्रानुसार बदलता है । अधिक वर्षावाले क्षेत्रों में चावल होता है । साधारण वर्षा वाले भागों में गेहूँ, ज्वार, कपास, दलहन आदि फसलें ली जाती हैं । वर्षाकाल में तैयार होने वाली फसलों को खरीफ की फसलें और शीतकाल में तैयार होने वाली फसलों को रबी की फसलें कहते हैं ।

४. खेती के अंतर्गत आने वाले कुल क्षेत्र का ७०% क्षेत्र खाद्यान्न की फसलों का और शेष क्षेत्र खाद्येतर फसलों का है ।

५. खेती की भूमि का बँटवारा होते रहने के कारण खेतों के आकारमान छोटे-छोटे हो गए हैं । इसके कारण भारतीय खेती में बड़े पैमाने पर यंत्रों का उपयोग करना कठिन हो गया है ।

६. भारत में एक ही समय में एक क्षेत्र में अनेक फसलें उगाई जाती हैं । सभी फसलों की वृद्धि के लिए मृदा का एक ही प्रकार का तत्व आवश्यक नहीं होता । दलहन की फसलें मृदा को नत्र देती हैं और कपास की फसल को नत्र अत्यावश्यक होता है ।

७. मिश्रित फसलों की खेती, भारतीय खेती की विशेषता है । कुछ भागों में एक ही क्षेत्र में वर्ष में दो बार फसलें उगाई जाती हैं । ऐसे क्षेत्रों को दो-फसली क्षेत्र कहते हैं । सिंचाई की सुविधा वाले कुछ क्षेत्रों में ग्रीष्मकालीन फसलें भी पैदा की जाती हैं ।

८. भारत में प्रति हेक्टर फसल उत्पादन कम है । अनेक वर्षों से लगातार खेती करते रहने से मृदा की उर्वरता को पूर्ववत होने का अवसर ही नहीं मिलता । साथ ही बड़ी मात्रा में खाद का उपयोग भी संभव नहीं है । वर्षा की अनियमितता और अनिश्चितता भी उत्पादन में प्रति हेक्टर कमी का एक प्रमुख कारण है ।

उपर्युक्त विशेषताओं से भारतीय खेती का स्वरूप स्पष्ट होता हैं । खेती संबंधी नियोजन करते समय इन विशेषताओं का उपयोग होता है ।

भारतीय कृषि का विकास :

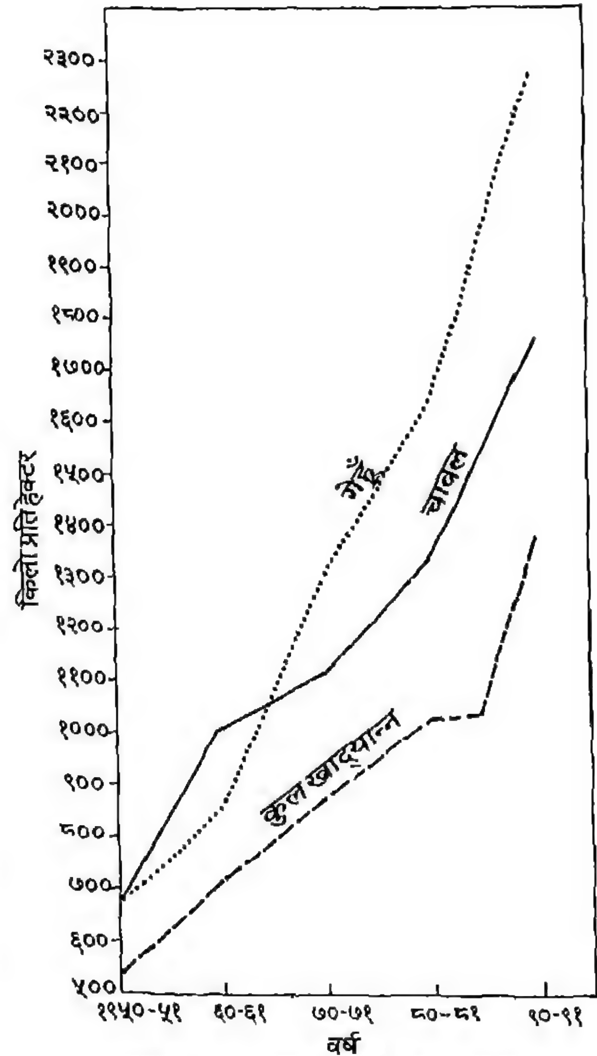
भारतीय खेती की सबसे अधिक महत्वपूर्ण आवश्यकता पानी है । खेती-योग्य भूमि और परपरागत कुशलता के कारण प्राचीनकाल से ही भारत में उत्तम प्रकार की खेती की जा रही है । कठिनाई है तो मानसून की अनियमितता, अनिशचितता और वर्षा के विचलन की । इन्हीं कारणों से पंचवर्षीय योजनाओं में बाँधों और नहरों को प्रधानता देकर देश की सिंचाई व्यवस्था में वृद्धि की गई है । सिंचाई का उपयोग, कम या अधिक मात्रा में, सभी जगह करने से विविध प्रकार की फसलें सर्वत्र होने लगी हैं । इससे कुछ भागों के अवर्षण की तीव्रता में कमी हुई है । साथ ही विविध प्रकार की फसलों के उत्पादन में भी पर्याप्त वृद्धि हो रही है ।

देश के लिए कृषि व्यवसाय का महत्व ध्यान में रखकर सरकार ने इस क्षेत्र में होने वाले शोध को प्रधानता दी है । भारतीय कृषि अनुसंधान परिषद नई दिल्ली नामक संस्था मृदा, फसलों की जाति, उत्पादन वृद्धि आदि के विषय में शोध करती है । गन्ना और कपास जैसी फसलों पर शोध करने के लिए स्थान-स्थान पर केंद्र स्थापित किए गए हैं । मृदा-प्रकार, सुधारित बीज का उत्पादन और विकास, उर्वरक, उत्पादन वृद्धि आदि के संबंध में शोध, देश के अनेक विश्वविद्यालयों में किया जा रहा है । बागायती फसलों और फल-वृक्षों के लगाने के विशेष प्रयत्न किए जा रहे हैं ।

भारत के कृषि विशेषज्ञों ने देश की प्राकृतिक और आर्थिक परिस्थितियों को ध्यान में रखकर सन १९६० के बाद भारत में पश्चिमी देशों के तंत्रज्ञान और नई शोधित पद्धति का सहारा लिया । इससे कृषि में बड़े परिवर्तन हुए; किंतु सच्ची क्रांति तो मेक्सिकन गेहूँ की विशिष्ट प्रजाति ने लाई, नार्मन बोरलाग नामक कृषि-विशेषज्ञ द्वारा विकसित तंत्र भारत में प्रयुक्त किया गया । यही हरित क्रांति का तंत्रज्ञान है । अधिक उत्पादन देने वाली फसलों की जाति, रासायनिक उर्वरकों का प्रयोग आदि हरित क्रांति के लिए कारणीभूत सिद्ध हुए । भारत में यह तंत्रज्ञान पहले पंजाब और हरियाणा में प्रयुक्त हुआ । यहाँ विक्रमी (रेकार्ड) उत्पादन हुआ । इस सफलता को देखकर चावल, बाजरा, मक्का आदि फसलों के लिए भी इस तंत्रज्ञान का उपयोग किया गया । इससे भारत की खाद्यान्न समस्या की तीव्रता कुछ मात्रा में कम हुई है । हरित क्रांति से प्रति हेक्टर तथा कुल उत्पादन में विपुल वृद्धि हुई है ।



आकृति ७.३ : हरितक्रांति गेहूँ का उत्पादन



आकृति ७.४ : भारत : प्रति हेक्टर उत्पादन

पंजाब और हरियाणा मूलतः गेहूँ उत्पादक प्रदेश हैं। यहाँ अब सिंचाई की सहायता से चायल की पैदावार ली जा रही है। दक्षिण में आंध्र प्रदेश और कर्नाटक राज्यों में गेहूँ उगाया जा रहा है। इसी प्रकार हरित क्रांति का प्रभाव कपास, गन्ना, तेलहन आदि फसलों के संबंध में भी दिख रहा है।

खाद्यान्न फसलों की ओर से ध्यान कम करके कपास, तेलहन, पटसन आदि उद्योगों के लिए उपयोगी होने वाली फसलों को उगाने की ओर भारतीय किसानों की रुझान आजकल दिखाई दे रही है।

खेती के अंतर्गत पशुपालन, मछली पकड़ना, वन-कृषि आदि का भी समावेश होता है। आजकल दुग्ध व्यवसाय और कुक्कुट पालन व्यवसाय वैज्ञानिक पद्धति से किए जाने के कारण उनके उत्पादन में वृद्धि हो रही है। मत्स्यकृषि के कारण मत्स्य उत्पादन में वृद्धि होने से किसानों को आर्थिक सहायता मिल रही है। परती भूमि को उत्पादन योग्य बनाने के लिए किसान वन-कृषि की ओर मुड़ने लगे हैं।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :
   क. भारतीय कृषि की .... विशेषता है।
   ख. पारिस्थितिक संतुलन की दृष्टि से .... प्रतिशत भूमि वन-क्षेत्र होनी चाहिए।
   ग. भारत में सबसे अधिक भूमि उपयोग .... क्षेत्र का है।

२. एक-एक वाक्य में उत्तर लिखो :
   च. हरित क्रांति का क्या आशय है ?
   छ. परती भूमि किसे कहते हैं ?

३. कारण लिखो :
   ट. हरित क्रांति के कारण कृषि उत्पादन में वृद्धि हुई है।
   ठ. भारत में प्रति हेक्टर उत्पादन कम है।

४. निम्नांकित प्रश्नों के उत्तर लिखो :
   त. भारत में खेती के प्रमुख उद्देश्य कौन-कौन-से हैं ?
   थ. भारतीय कृषि की विशेषताएँ लिखो।

* * *

प्रकरण ८

सिंचाई

भारतीय कृषक मुख्यत: वर्षा पर आधारित कृषि करता रहा है। फसलों के समुचित विकास तथा अधिक उत्पादन के लिए नियमित तथा उचित मात्रा में जलपूर्ति आवश्यक है। फसलों को वर्षा तथा सिंचन से जलपूर्ति होती है। इस प्रकरण में हम भारत में सिंचाई का अध्ययन करेंगे।

सिंचाई की आवश्यकता :

भारतीय वर्षा के मौसमी स्वरुप, उसकी अनियमितता तथा वितरण के फलस्वरूप वर्षा का जल सर्वत्र उपलब्ध नहीं होता है। *भारतीय जल-संपत्ति का अध्ययन करते हुए हमने यह ध्यानपूर्वक* देखा है कि वर्षा जलपूर्ति का बारहमासी स्रोत नहीं है। तथापि वर्षा का जल कुआँ, तालाब, नदी आदि माध्यम से खेती तथा अन्य उपयोगों के लिए मानव को प्राप्त होता है।

भारत की मात्र ३०% कृषि योग्य भूमि पर पर्याप्त वर्षा होती है। शेष ७०% भूमि पर इतनी कम वर्षा होती है कि फसलों का उचित उत्पादन सिंचाई के बिना संभव नहीं है। गन्ना तथा चावल सदृश *फसलों के लिए जल की आवश्यकता* सिंचाई से ही पूरी होती है।

राज्य स्तर पर वर्षा की मात्रा तथा वहाँ की कुल कृषि योग्य भूमि का अध्ययन करने पर हमें ज्ञात होता है कि किन क्षेत्रों में सिंचाई की आवश्यकता है। केरल, उड़ीसा, पशिचम बंगाल, मणिपुर, असम, त्रिपुरा, नागालैंड, मेघालय, सिक्किम आदि राज्यों की संपूर्ण कृषि योग्य भूमि अधिक वर्षा के प्रदेश में आती है। इसके विपरीत जहाँ की ७५% से अधिक कृषि योग्य भूमि अपर्याप्त वर्षा के प्रदेश में है, वे राज्य पंजाब, हरियाणा, राजस्थान, गुजरात, महाराष्ट्र तथा कर्नाटक हैं। प्रतिकूल परिस्थिति मानव को परिश्रम करना सिखाती है। अत: अत्यल्प वर्षावाले प्रदेशों ने सिंचाई तथा कृषि उत्पादन में अच्छी प्रगति की है।

सिंचाई के प्रमुख उद्देश्य :

सिंचाई द्वारा कम वर्षावाले क्षेत्र आर्थिक दृष्टि से लाभदायक कृषि के अंतर्गत आ गए हैं। जिन प्रदेशों में पर्याप्त वर्षा होती है तथा भूमिगत जल उपलब्ध है, वहाँ सिंचाई से प्रति हेक्टर उपज बढ़ गई है। इसी कारण वर्ष में एक से अधिक फसलों का प्राप्त होना निश्चित रूप से संभव हुआ है। सिंचाई से फसलों का प्राप्त होना निश्चित रूप से संभव हुआ है। सिंचाई से फसलों की संख्या बढ़ी है। आधुनिक कृषि पद्धति में संकरित बीज तथा रासायनिक खादों के उपयोग के लिए सिंचाई आवश्यक है। सूखे वाले क्षेत्रों में भी कृषि उत्पादन वृद्धि में सिंचाई सहायक सिद्ध हुई है।

सिंचाई के स्रोत :

सिंचाई के लिए जल भूपृष्ठ तथा भूगर्भ से प्राप्त होता है। इस प्रकार भूगर्भीय स्रोत तथा भूपृष्ठीय स्रोत, सिंचाई के स्रोतों के प्रमुख प्रकार हैं।

भूगर्भीय जल स्रोत :

कुएँ एवं नलकूप भूजल के स्रोत हैं। भारत में बहुत पहले से कुओं का उपयोग होता है। भारत के कुल सिंचित क्षेत्र का ४९% कुओं तथा नलकूपों द्वारा सींचा जाता है। कुआँ खोदना तथा उससे पानी निकालना कम खर्चीला होता है अत: कृषक व्यक्तिगत आधार पर कुएँ खोदता है। भारत में कुओं की बहुत बड़ी संख्या इसका प्रमाण है। पर्याप्त भूजल भंडार होने तथा नहरों की कमी के कारण कुओं तथा नलकूपों का उपयोग लोकप्रिय हुआ है। गुजरात, महाराष्ट्र, पंजाब, राजस्थान तथा उत्तर प्रदेश आदि राज्यों में कुओं *की संख्या अधिक है। केंद्रशासित प्रदेश, दादरा, नगर हवेली में* सिंचाई पूर्ण रुप से कुओं पर आधारित है। गुजरात, राजस्थान, पंजाब, हरियाणा तथा उत्तर प्रदेश राज्यों में नलकूपों की संख्या अधिक है।

केंद्र तथा राज्य सरकारें किसानों को कुआँ तथा नलकूप लगवाने के लिए आर्थिक सहायता देती हैं। इसी कारण आजकल कुओं, नलकूपों तथा पंपिंग सेटों की संख्या में खूब वृद्धि हुई है।

भूपृष्ठीय स्रोत :

नदी, नाला, तालाब तथा झीलों का जल भूपृष्ठीय सिंचाई का स्रोत है। यह पानी नहरों द्वारा तथा उलीच कर खेतों तक लाया जाता है।

तालाब :

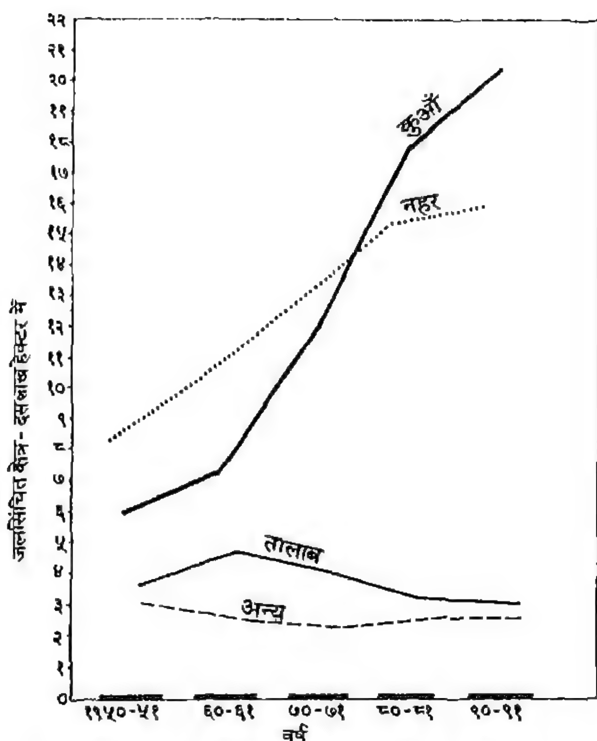
नाले, नदियाँ, तालाब, झीलें आदि भूपृष्ठीय जल सिंचन के स्रोत हैं। इनका पानी नहर तथा उदंचन पद्धति से खेती तक पहुँचाया जाता है।

भारतीय पठारी प्रदेश में चट्टानों की सछिद्रता कम होने तथा प्रदेश ढालू होने के कारण वर्षा का जल बहकर निचले भागों में संचित होता है और तालाब का रूप ले लेता है। भारत में तालाबों द्वारा सिंचित क्षेत्र सीमित हैं। यह कुल सिंचित क्षेत्र का मात्र ९% है। छत्तीसगढ़ तथा तमिलनाडु राज्य में कुआँ तथा नहरों की अपेक्षा तालाबों द्वारा विस्तृत क्षेत्र में सिंचाई होती है। **उसी प्रकार उड़ीसा, आंध्रप्रदेश, कर्नाटक तथा महाराष्ट्र में तालाबों द्वारा सिंचाई महत्वपूर्ण है। इससे स्पष्ट होता है कि दक्षिण भारत में सिंचाई मुख्य रूप से तालाबों द्वारा होती है।**

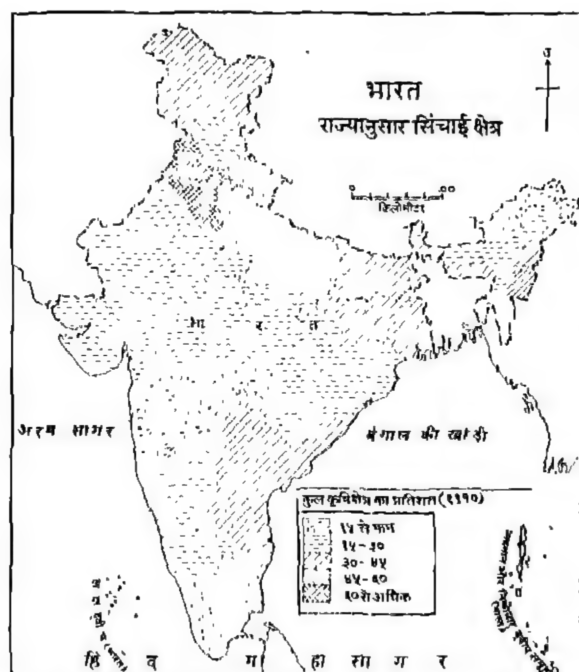
नहरें :

भारत में नहरों द्वारा विस्तृत क्षेत्र पर सिंचाई की जाती है। कुल सिंचित भूमि के ३९% पर नहरों द्वारा सिंचाई होती है। उड़ीसा, पश्चिम बंगाल, पंजाब, हरियाणा, आंध्र प्रदेश, बिहार, झारखंड, केरल, मध्य प्रदेश, छत्तीसगढ़, कर्नाटक, तमिलनाडू, उत्तर प्रदेश, आदि राज्यों में नहरों द्वारा सिंचाई अधिक होती है।

नहरों के बारहमासी तथा सामायिक प्रकार होते हैं। नदियों पर बाँध बनाकर तैयार जलाशयों से बारहमासी नहरें निकाली



आकृति क्र ८.१ विविध साधनों के अंतर्गत सिंचाई क्षेत्र



आकृति क्र. ८.२ भारत : राज्यानुसार सिंचित भूमि का वितरण

जाती हैं । नदियों पर बिना बाँध बनाए किनारों को खोदकर सामायिक नहरें बनाई जाती हैं । नदी में बाढ़ आने पर नहरों द्वारा अधिक-से-अधिक जल खेतों को पहुँचाया जाता है। बाढ़ कम होने पर नदी में पानी की मात्रा कम हो जाती है तथा ये नहरें कुछ समय तक बंद रहती हैं । इस प्रकार की नहरें मुख्यत: पंजाब तथा उत्तर प्रदेश में पाई जाती हैं ।

उदंचन सिंचाई :

नदियों तथा जलाशयों से पानी पंपों द्वारा ऊपर उठाकर खेतों तक पहुँचाया जाता है । इसको उदंचन सिंचाई कहते हैं । उदंचन सिंचाई के अंतर्गत मात्र ३% क्षेत्र आता है । फिर भी जिन क्षेत्रों में नहरें नहीं हैं वहाँ के लिए उदंचन वरदान है । विशेषत: पश्चिमी घाट के समीपवर्ती पूर्वी भागों में तथा उत्तर-पूर्वी भारत के पर्वतीय भागों में यह पद्धति प्रयोग में लाई जाती है । उदंचन सिंचाई के लिए नदियों में पर्याप्त जल होना आवश्यक है । अन्य साधनों की तुलना में यह अधिक खर्चीला है । अत: यह पद्धति सहकारिता अथवा सरकारी स्तर पर चलाई जाती है ।

सिंचित क्षेत्र का वितरण :

देश की कुल खेतिहर भूमि का ३४% सिंचित है किंतु इनका राज्यानुसार वितरण बहुत असमान है। पंजाब तथा हरियाणा राज्य की कुल खेतिहर भूमि का ६०% सिंचित है । तमिलनाडु, उत्तरांचल तथा उत्तर प्रदेश के ४० से ६०% क्षेत्र सिंचित है। सिंचित क्षेत्र की बहुत कम मात्रा मध्य प्रदेश, छत्तीसगढ़, महाराष्ट्र, कर्नाटक, केरल आदि राज्यों में है।

सिंचाई प्रकल्प :

स्वतंत्रता प्राप्ति के बाद देश की विकास योजनाओं में सिंचाई को प्रधानता दी गई । कृषि के लिए जल की कमी को देखते हुए यह आवश्यक था । नहरों द्वारा नदी जल को खेतों में पहुँचाकर देश ने अच्छी प्रगति की है ।

भारत में बाँधों की संख्या अधिक है । भारत में जलसिंचन प्रकल्पों के बड़े, मध्यम तथा छोटे प्रकार किए जाते हैं । बड़े प्रकल्प बहुधा बहुद्देशीय प्रकल्प हैं । ये प्रकल्प सिंचाई के साथ-साथ अन्य अनेक उद्देश्यों की पूर्ति करते हैं ।

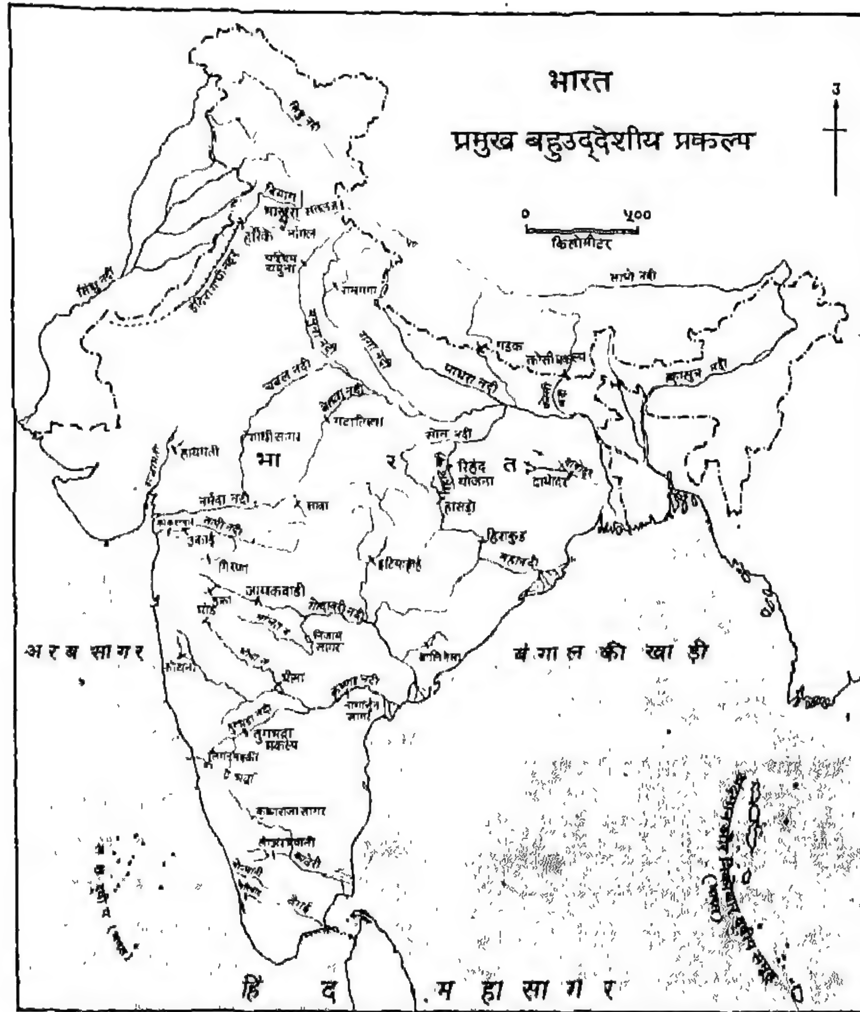
बहुद्देशीय प्रकल्पों का प्राथमिक उद्देश्य नदियों पर बाँध बाँधकर नहरों द्वारा खेती को जलपूर्ति करना है । बाढ़ नियंत्रण, जलविद्युत उत्पादन, मत्स्योद्योग, यातायात की सुविधा, पर्यटन तथा विश्रांति स्थलों का विकास आदि बहुद्देशीय प्रकल्पों के प्रमुख उद्देश्य हैं ।

मानचित्र में भारत की कुछ योजनाओं को दर्शाया गया है, इनमें से हम कुछ की जानकारी प्राप्त करेंगे ।

दामोदर घाटी योजना :

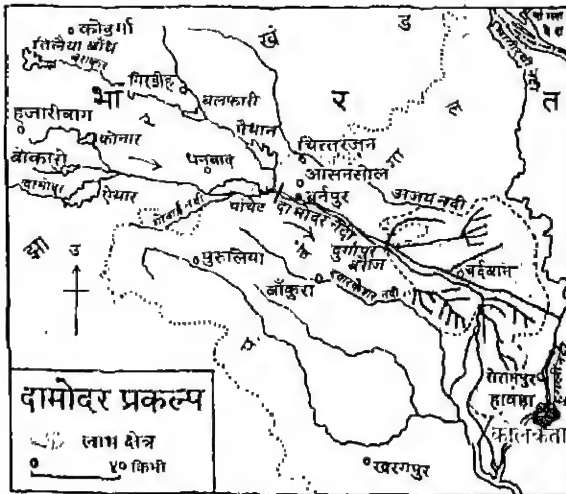
दामोदर घाटी विकास की रूपरेखा सन १९४८ में तैयार की गई थी । यह काम विभिन्न चरणों में पूरा किया गया । इस योजना के पूरा होने के पहले बिहार तथा पश्चिम बंगाल में बाढ़ से बहुत बड़ी मात्रा में धन-जन की हानि होती थी । दामोदर नदी, हुगली नदी की सहायक है । इस विकास योजना के अंतर्गत दामोदर तथा इसकी सहायक नदियों पर अनेक स्थानों पर बाँध बनाए गए ।

इस बहुद्देशीय प्रकल्प से इस क्षेत्र में आने वाली बाढ़ नियंत्रित हो गई है । नहरें निकालकर कृषि के लिए जलपूर्ति तथा जल-यातायात का काम लिया जाता था । इससे इस क्षेत्र के लौह-खनिज तथा कोयला की ढुलाई कम खर्चे में की जाती है । कुछ बाँधों पर जलविद्युत तैयार की जाती है । यहाँ के औद्योगिक क्षेत्रों



आकृति क्र. ८.३ भारत : प्रमुख बहुद्‌देशीय प्रकल्प

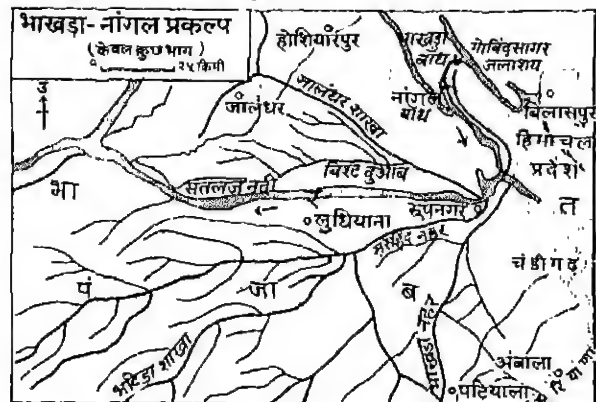
को बडी मात्रा में जलपूर्ति की जाती है। बिहार, झारखंड तथा पश्चिम बंगाल के विकास के लिए दामोदर घाटी योजना वरदान सिद्‌ध हुई है।



आकृति क्र. ८.४ दामोदर घाटी योजना

भाखड़ा-नांगल प्रकल्प :

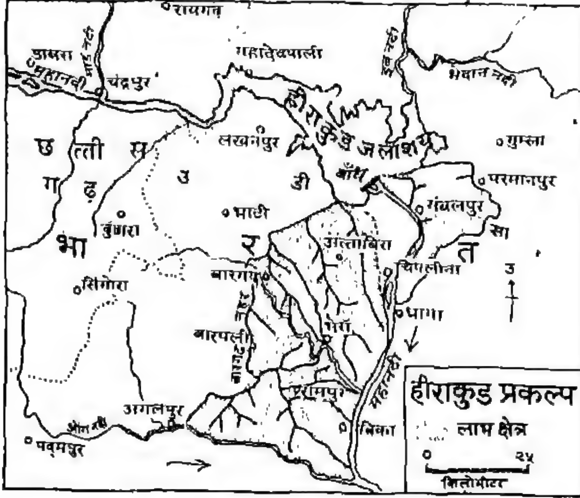
सतलज नदी पर दो चरणों में यह प्रकल्प तैयार हुआ है। पहले चरण में हिमालय प्रदेश के भाखड़ा स्थान पर २२६ मीटर ऊँचा बाँध बनाया गया है। यह विश्व के सबसे ऊँचे बाँधों में से एक है। इस बाँध के जलाशय को गोविंद सागर कहते हैं। दूसरे चरण में भाखड़ा बाँध के दक्षिण में पंजाब राज्य के नांगल स्थान पर दूसरा बाँध बनाया गया। इस बाँध से सिंचाई के लिए नहरों के साथ ही चार जलविद्‌युत-उत्पादन गृह बनाए गए हैं। इस प्रकल्प का लाभ पंजाब तथा हरियाणा राज्यों को मिला है। भारत में हरित क्रांति का श्री गणेश इस प्रकल्प के लाभ क्षेत्र में हुआ। इससे गेहूँ तथा चावल का यशस्वी उत्पादन हुआ। विद्‌युत उपलब्धता के कारण पंजाब तथा हरियाणा राज्यों में अनेक छोटे- बड़े उद्‌योगों का तीव्र गति से विकास हुआ।



आकृति क्र. ८.५ भाखड़ा-नांगल प्रकल्प

हीराकुड योजना :

उड़ीसा राज्य में संबलपुर के पश्चिम में महानदी पर यह योजना बनाई गई है। हीराकुड के अतिरिक्त टीकरपाड़ा तथा नराज स्थानों पर महानदी पर बाँध बनाए गए हैं। हीराकुंड में जलविद्‌युत पैदा की जाती है। महानदी तथा उसकी सहायक नदियों में आई बाढ़ का नियंत्रण तथा उस क्षेत्र की कृषि की जलपूर्ति का उद्‌देश्य इससे पूरा हुआ है। जलविद्‌युत से कृषि तथा औद्‌योगिक विकास को गति मिली है।

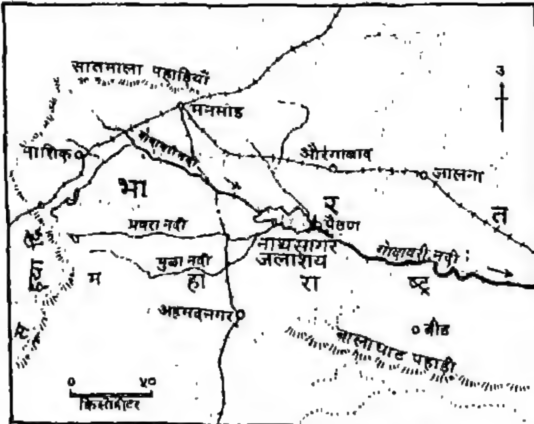


आकृति क्र. ८.६ हीराकुड योजना

जायकवाड़ी प्रकल्प :

यह बाँध महाराष्ट्र के औरंगाबाद जिले में पैठण के समीप गोदावरी नदी पर बनाया गया है। इससे निर्मित जलाशय का नाम 'नाथसागर' है। इस प्रकल्प के द्‌वारा अहमदनगर, औरंगाबाद, जालना, बीड़ तथा परभणी जिलों में कृषि-भूमि की सिंचाई की जाती है। बाँध के समीप ही जलविद्‌युत उत्पादन होता है। विद्‌युत उत्पादन के बाद उस जल को उदंचन कर पुनः बाँध में छोड़ा जाता है। भारत में यह इस प्रकार की दुहरी योजना का एकमात्र प्रकल्प है।

बाँध के परिसर में कर्नाटक राज्य के म्हैसूर के वृंदावन उद्‌यान की तरह संत ज्ञानेश्वर नामक उद्‌यान विकसित किया गया है। यहाँ, मत्स्य पालन केंद्र, पक्षी अभयारण्य तथा पर्यटन केंद्र विकसित किया जा रहा है।



आकृति क्र. ८.७ जायकवाड़ी प्रकल्प

राजस्थान नहर योजना :

यह योजना पंजाब तथा राजस्थान राज्य के सहयोग से अस्तित्व में आई है। पंजाब में सतलज तथा ब्यास नदियों के संगम के पास हरिके स्थान पर बाँध बनाया गया है। इस बाँध से नहर निकाल कर पंजाब के कुछ भागों तथा राजस्थान के मरुस्थली प्रदेश में गंगानगर, बीकानेर, जैसलमेर आदि जिलों में जल की पूर्ति हुई है। इसके कारण कपास, गेहूँ आदि का बड़े पैमाने पर उत्पादन हो रहा है। मुख्य नहर ' इंदिरा गांधी नहर ' के नाम से जानी जाती है।

पेरियर प्रकल्प :

केरल राज्य में पश्चिम की ओर प्रवाहित होने वाली पेरियर नदी पर बाँध बनाकर पानी पूर्व की ओर प्रवाहित होने वाली वैगाई नदी में छोड़ा जाता है। इस प्रकल्प से तमिलनाडु के मदुरै तथा केरल के एर्नाकुलम जिलों को लाभ हुआ है।

कोसी, रिहंद, चंबल, तुंगभद्रा, नागार्जुन सागर आदि भारत कुछ अन्य बहुद्‌देशीय योजनाएँ हैं। आजकल उत्तरांचल के गढ़वाल जिले में टेहरी प्रकल्प तथा मध्य प्रदेश में नर्मदा नदी पर सरदार सरोवर प्रकल्प का काम प्रगति पर है।

जल-व्यवस्थापन तथा नियोजन :

सिंचाई की उपलब्धता से भारतीय कृषि में बड़ा परिवर्तन आया है। फसलों के उत्पादन में निश्चितता के साथ प्रति हेक्टर उत्पादन बढ़ा है। पारंपारिक फसलों के स्थान पर किसान नवीन विविध प्रकार की फसलों का उत्पादन कर रहे हैं। इन सभी अच्छे परिणामों के साथ ही जल के अनियंत्रित उपयोग के कुछ दुष्परिणाम भी सामने आने लगे हैं।

सिंचाई मात्र पानी की उपलब्धता पर ही निर्भर नहीं है, बल्कि वह पानी की उपलब्धता के साथ-साथ मृदा के प्रकार, उसके रासायनिक गुणधर्म, खेत की ढलान, वाष्पीकरण की मात्रा पर भी अवलंबित है। सतत सिंचाई से मिट्‌टी का क्षार पानी में घुलकर, वाष्पीकरण होने पर ऊपर जम जाता है। इस प्रकार धरातल पर क्षार की एक परत जम जाती है, जिससे मिट्‌टी अनुपजाऊ हो जाती है। उत्तर प्रदेश के पश्चिमी भाग में क्षारमय भूमि की बिकट समस्या पैदा हो गई है।

राजस्थान के इंदिरा नहर क्षेत्र में जल रिसाव से नम-भूमि तथा उसके चारों ओर क्षारमय, अनुपजाऊ भूमि की पट्‌टी तैयार हो रही है। अति सिंचन से उत्तर प्रदेश, पंजाब तथा उड़ीसा में नम भूमि तैयार हो गई है। अतः पानी का सावधानीपूर्वक नियंत्रित उपयोग आवश्यक है। अल्पकालीन लाभ के लिए अति सिंचन करके उर्वर मृदा सदृश प्राकृतिक संपत्ति का विनाश करके कृषि व्यवसाय का भविष्य संकटमय करना है।

भूजल का उपयोग करते हुए भी व्यवस्थापन आवश्यक है। कुछ वर्षों से भूजल के उपयोग में बहुत वृद्‌धि हुई है। इस कारण इसका स्तर निरंतर नीचे होता जा रहा है। कम वर्षा तथा जल के शीघ्र बह जाने के कारण भूजल का भंडार बढ़ता नहीं है। भूजल का भंडार बढ़ाने के लिए ' पानी रोको, पानी रिसाओ ' योजना की रूपरेखा तैयार की गई है। ग्राम स्तर पर छोटे-छोटे नालों पर

बाँध बनाकर तालाब तैयार करना चाहिए । इसके लिए जनता का सक्रिय सहयोग आवश्यक है ।

जलाशयों तथा नहरों में पानी के रिसाव तथा वाष्पीकरण पर नियंत्रण होना चाहिए । भारत जैसे अधिक तापमान वाले देश में फौव्वारा सिंचन का उपयोग आवश्यक है । अतिसिंचन पर नियंत्रण तथा सँभालकर पानी का उपयोग करके जिन खेतों को जल उपलब्ध नहीं हो, उन्हें सिंचित किया जा सकता है ।

किसानों को अपने खेत से पानी के निकास की व्यवस्था करने, वर्ष में कुछ समय तक खेतों को पानी न देकर सूखा रखने, मिट्टी के गुणानुसार सिंचाई का नियंत्रित उपयोग करने, जैविक खादों का उपयोग बढ़ाने आदि पर ध्यान देना आवश्यक है ।

भविष्य में जल की बढ़ती हुई माँग की पूर्ति के लिए सरकार ' राष्ट्रीय जल-जाल योजना ' पर विचार कर रही है । इसके अंतर्गत गंगा को कावेरी तथा ब्रह्मपुत्र को गंगा से नहरों द्‌वारा जोड़ना, नर्मदा नदी से नहरें निकालकर गुजरात तथा पश्चिम राजस्थान की ओर मोड़ देना है । साथ ही चंबल नदी से मध्य राजस्थान तक नहरें निकालना और पश्चिमघाट में पश्चिम की ओर प्रवाहित होने वाली नदियों को पूर्व की ओर मोड़ना आदि राष्ट्रीय जल-जाल योजना का एक हिस्सा है ।

यद्‌यपि इस योजना में कुछ आर्थिक तथा तांत्रिक कठिनाइयाँ हैं तथापि इसके मूर्त रूप लेने पर देश में अकाल तथा बाढ़ पर नियंत्रण हो जाएगा, कृषि का सर्वांगीण विकास होगा । आंतरिक जल यातायात बढ़ेगा तथा उद्‌योग-धंधों का विकास होगा । वास्तविक अर्थों में भारत सुजलाम, सुफलाम बन सकेगा ।

स्वाध्याय

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१. रिक्त स्थानों में उचित शब्द लिखो :
(१) नलकूप .... प्रकार का सिंचाई का साधन है ।
(२) भारत के ....तथा .... राज्य में सिंचित क्षेत्र अधिक है ।
(३) भारत में .... बाँध सबसे ऊँचा है ।
(४) महानदी पर .... बहुद्‌देशीय प्रकल्प है ।

२. निम्नांकित प्रश्नों के उत्तर एक वाक्य में लिखो :
(१) सामायिक नहर किसे कहते हैं ?
(२) उदंचन सिंचाई का क्या आशय है ?

३. निम्नलिखित प्रश्नों के उत्तर संक्षेप में लिखो :
(१) बहुद्‌देशीय प्रकल्प का क्या अर्थ है ?
(२) जायकवाड़ी प्रकल्प का महत्व लिखो ।
(३) अति जल सिंचन के कौन-से दुष्परिणाम होते हैं ?

४ भारत की रेखाकृति में निम्नांकित को दर्शाते हुए यथास्थान उनके नाम लिखो:
(१) गोविंद सागर
(२) हीराकुड प्रकल्प
(३) सबसे अधिक सिंचाई वाले राज्य

(आ)

१. सिंचाई क्षेत्र में जाकर अंकित करो कि वहाँ कौन-कौन-सी फसलें पैदा होती हैं?
२. बहुद्‌देशीय प्रकल्प पर जाकर उससे सिद्‌ध होने वाले उद्‌देश्यों को लिखो ।

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प्रकरण ९

प्रमुख फसलें

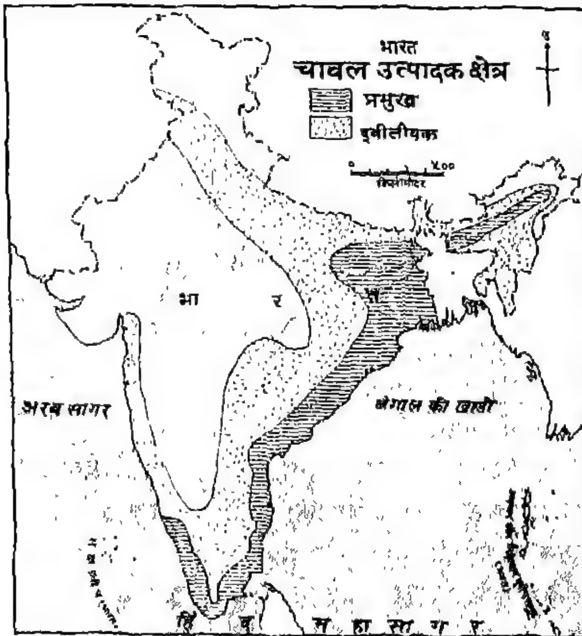
भारत में पहले से ही अधिक जनसंख्या होने के कारण यहाँ कृषि में खाद्यान्न उत्पादन को प्रधानता दी गई है। यहाँ अन्य फसलें भी उगाई जाती हैं। चावल, गेहूँ, ज्वार, बाजरा, दलहन आदि खाद्य फसलें हैं। कपास, पटसन, रबर, तंबाकू आदि अन्य फसले हैं।

प्रमुख फसलें :

१. चावल :

यह भारत में प्रमुख खाद्य फसल है। विश्व के संपूर्ण चावल-उत्पादक क्षेत्र का २९% क्षेत्र भारत में है। भारत की कुल कृषिभूमि के २२% पर चावल की कृषि होती है।

चावल मुख्यतः उष्णार्द्र जलवायु की फसल है। इसके उत्पादन के लिए १०० सेमी. से अधिक वर्षा की आवश्यकता होती है। अतः जिन क्षेत्रों में वर्षा का औसत १५० से २०० सेमी. तक है, यहाँ इसकी फसल बिना सिंचाई के उगाई जाती है। इसके लिए उपजाऊ दोमट मिट्टी उत्तम होती है। यह फसल मुख्यतः पूर्वी तथा पश्चिमी तटीय प्रदेश एवं उत्तर भारतीय मैदान के पूर्वी भाग में पैदा की जाती है।



आकृति ९.१ भारत : चावल उत्पादक क्षेत्र

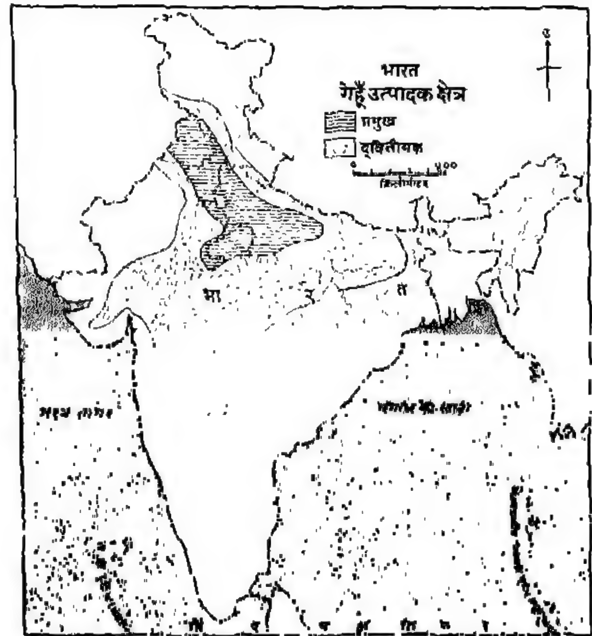
कम वर्षा वाले पंजाब, हरियाणा तथा पश्चिमी उत्तर-प्रदेश में सिंचाई द्वारा चावल के उत्पादन तथा क्षेत्र में वृद्धि हुई है। पंजाब राज्य में प्रति हेक्टर उत्पादन सबसे अधिक है। देश में चावल के कुल उत्पादन में पश्चिम बंगाल का प्रथम स्थान है।

२. गेहूँ :

क्षेत्र तथा उत्पादन की दृष्टि से गेहूँ दूसरी महत्वपूर्ण फसल है। भारत की कुल कृषिगत भूमि के १३% पर गेहूँ की खेती होती है। हरित क्रांति के वैज्ञानिक ज्ञान से देश में इस फसल का उत्पादन बहुत अधिक बढ़ा है।

ठंडी जलवायु की फसल होने के कारण भारत में इसका उत्पादन रबी फसल में होता है। इस फसल के लिए ७५ सेमी. वर्षा पर्याप्त होती है। सिंचाई के साधनों के सहारे यह फसल ठंडी जलवायुवाले ५० सेमी. से कम वाले क्षेत्र में भी उगाई जाती है। गेहूँ का उत्पादन दोमट तथा जैविक द्रव्य युक्त काली मिट्टी में अच्छा होता है।

उत्तर प्रदेश, पंजाब, हरियाणा, मध्य प्रदेश तथा पूर्व राजस्थान बड़ी मात्रा में गेहूँ का उत्पादन करते हैं। क्षेत्र तथा उत्पादन की दृष्टि से उत्तर प्रदेश का प्रथम स्थान है। प्रति हेक्टर उत्पादन में पंजाब का पहला स्थान है। गुजरात, महाराष्ट्र, कर्नाटक तथा बिहार राज्य में गेहूँ के उत्पादन में वृद्धि हुई है।



आकृति ९.२ भारत : गेहूँ उत्पादक क्षेत्र

३. ज्वार :

यह खरीफ तथा रबी दोनों में पैदा होने वाली फसल है। पिछले ४० वर्षों में ज्वार-उत्पादन क्षेत्र में कोई परिवर्तन नहीं हुआ है। मात्र प्रति हेक्टर उत्पादन में उल्लेखनीय वृद्धि हुई है। भारत की कुल कृषिगत भूमि के ११% पर इसकी खेती होती है।

ज्वार अधिक गर्मी तथा कम वर्षा में बढ़ने वाली फसल है। समान वितरित ५० सेमी. वर्षा इस फसल के लिए पर्याप्त होती है। रेगूर मृदा में यह फसल खूब पैदा होती है।

ज्वार के क्षेत्र तथा उत्पादन की दृष्टि से देश में महाराष्ट्र का प्रथम स्थान है। ज्वार फसल के अंतर्गत कुल भूमि का ४२% तथा कुल उत्पादन का ५०% महाराष्ट्र में होता है। इसके अतिरिक्त कर्नाटक,मध्य प्रदेश, गुजरात तथा आंध्र प्रदेश प्रमुख ज्वार उत्पादक राज्य हैं।

४. दलहन फसलें :

भारत के शाकाहारी लोगों के भोजन में प्रोटीन की पूर्ति दालों द्वारा की जाती है। भारत में कुल कृषि योग्य भूमि के १५ % पर विविध दलहनों का उत्पादन होता है। अरहर, मूँग, उड़द, चना, मटर, मसूर आदि दलहन की फसलें देश में सर्वत्र कम-अधिक मात्रा में पैदा होती हैं। दलहन की फसलों से भूमि को नाइट्रोजन मिलता है।

मध्य प्रदेश, राजस्थान, उत्तर प्रदेश, महाराष्ट्र, उड़ीसा, बिहार, आंध्र प्रदेश, हरियाणा, कर्नाटक तथा तमिलनाडु राज्यों में विभिन्न दलहनों का उत्पादन होता है। इनमें से कुछ का उत्पादन खरीफ तथा कुछ का रबी की फसल में होता है।

५. तेलहन फसलें :

भारत में अनेक तेलहन पदार्थों का उत्पादन होता है। मूँगफली, तिल, बर्रे, अलसी, सरसों, सूर्यमुखी, सोयाबीन आदि प्रमुख तेलहन की फसलें हैं। इनके अतिरिक्त बिनौला तथा नारियल की गरी से तेल निकाला जाता है। नारियाल उत्पादन में भारत, विश्व में अग्रणी देश है।

तेलहन की फसलें सामान्यत: बिना सिंचाई द्वारा पैदा की जाती हैं। सरसों जैसी फसलें सिंचाई द्वारा उगाई जाती हैं। देश की कुल कृषि योग्य भूमि के १३% क्षेत्र पर तेलहन की खेती होती है। भारतीयों के आहार में विविध प्रकार के तेलों का आवश्यक भाग होता है। अत: तेलहनों के उत्पादन का विशेष महत्व है।

तेलहन के उत्पादन में गुजरात राज्य प्रथम क्रमांक पर है। इसके बाद आंध्र प्रदेश, उत्तर प्रदेश, मध्य प्रदेश, महाराष्ट्र, राजस्थान, कर्नाटक तथा तमिलनाडु क्रमानुसार महत्वपूर्ण राज्य हैं।

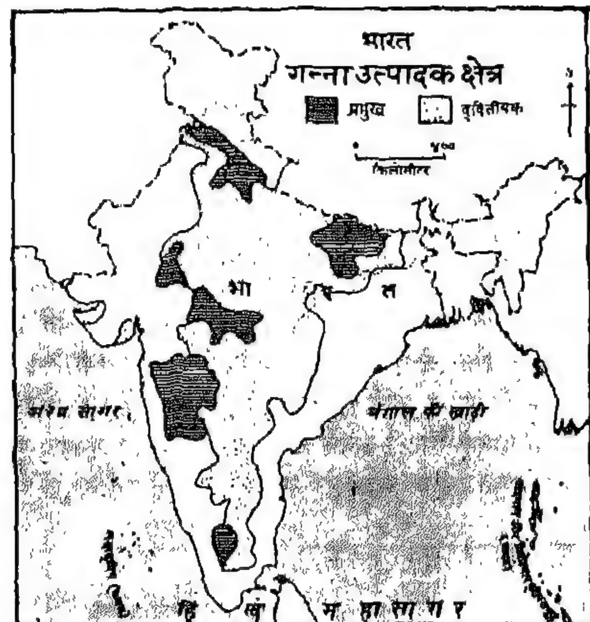
मूँगफली भारत में महत्वपूर्ण तेलहन की फसल है। अधिक-से-अधिक लोग इस तेल का उपयोग अपने आहार में करते हैं। इसकी फसल के लिए ५० से ७५ सेमी. वर्षा आवश्यक होती है। भुरभुरी मिट्टी जिससे पानी का छनन सरलतापूर्वक होता हो, इसकी खेती के उपयुक्त होती है। देश में कुल तेलहन उत्पादक क्षेत्र के लगभग आधे पर मूँगफली पैदा की जाती है। गुजरात, महाराष्ट्र, आंध्रप्रदेश, कर्नाटक, तमिलनाडु राज्य इसके उत्पादन में अग्रणी हैं।

देश में तेलहन से प्राप्त होने वाले तेल की माँग पर विचार करते हुए सोयाबीन, सूर्यमुखी तथा ताड़ का उत्पादन बढ़ाने का प्रयत्न किया जा रहा है।

६. गन्ना :

भारत गन्ने का मूलस्थान है। यह उष्ण कटिबंधीय तथा उपोष्ण कटिबंधीय फसल है। भारत में कुल कृषिगत भूमि के ४% क्षेत्र में गन्ने का उत्पादन होता है। विश्व में भारत में सबसे अधिक क्षेत्र में गन्ने की खेती होती है।

मिट्टी से पोषक तत्वों का अधिक शोषण करने वाली फसल होने के कारण गन्ने को खाद की अधिक आवश्यकता होती है। गन्ने के लिए भुरभुरी तथा पानी के निकास वाली मिट्टी अधिक पोषक होती है। लावा मिश्रित उपजाऊ काली मिट्टी इस फसल के लिए अधिक उपयुक्त होती है। गन्ने के लिए अधिक तापमान तथा १०० सेमी. से अधिक वर्षा की आवश्यकता पड़ती है। कम वर्षावाले क्षेत्रों में इसकी समय-समय पर सिंचाई की जाती है। सिंचाई से फसल अच्छी तथा निश्चित होती है।



आकृति १.३ भारत : गन्ना उत्पादक क्षेत्र

उत्तर प्रदेश, बिहार, हरियाणा, पंजाब, तमिलनाडु, कर्नाटक तथा महाराष्ट्र आदि प्रमुख गन्ना उत्पादक राज्य हैं। कुल गन्ना उत्पादक क्षेत्र की दृष्टि से उत्तर प्रदेश का प्रथम स्थान है ; परंतु प्रति हेक्टर उत्पादन की दृष्टि से तमिलनाडु अग्रणी है। अनुकूल तापक्रम तथा मिट्टी होने के कारण दक्षिण के राज्यों के गन्ने में शक्कर की मात्रा अधिक होती है।

७. मसाले :

भारत बहुत पहले से मसालों के उत्पादन के लिए प्रसिद्ध है। यह फसल उष्णार्द्र जलवायु में अधिक पैदा होती है। इस फसल के अंतर्गत बहुत कम क्षेत्र होने पर भी इनका उत्पादन आर्थिक दृष्टि से बहुत महत्वपूर्ण है। अंतर्राष्ट्रीय बाजार में मसालों की माँग होने के कारण इसके निर्यात से भारत को विदेशी मुद्रा मिलती है। भारत में मिर्च, इलायची, अदरक, हल्दी, काली मिर्च, लवँग, जीरा, जायफल, धनियाँ आदि मसालों के अनेक पदार्थ पैदा होते हैं। ये मुख्यत: केरल, कर्नाटक, तमिलनाडु तथा महाराष्ट्र राज्यों में पैदा होते हैं।

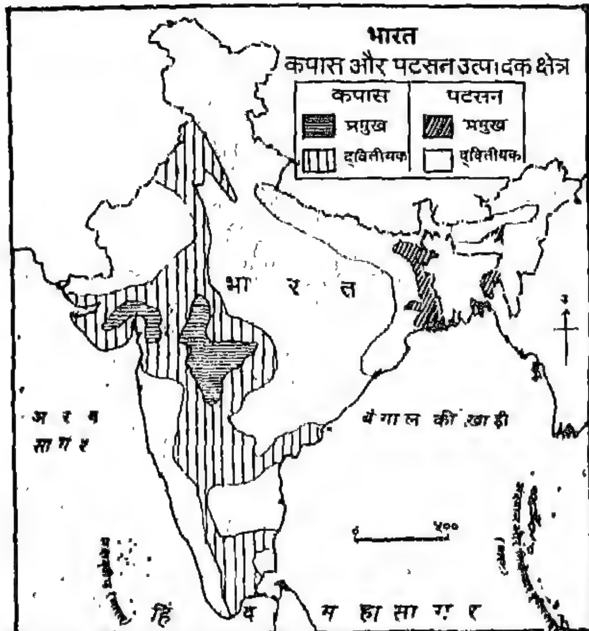
८. कपास :

कपास का उत्पादन सर्वप्रथम भारत में हुआ था। इसीलिए हथकरघा उद्योग भारत का प्राचीन उद्योग है। देश में संपूर्ण

कृषियोग्य भूमि के ६% पर कपास की खेती होती है।

इसके लिए गहरी काली मिट्टी अधिक उपयुक्त होती है। समान वितरण वाले कम वर्षा के क्षेत्र में यह फसल अच्छी होती है। वर्षा के अभाव में सिंचाई द्वारा अच्छा उत्पादन होता है। कपास चुनते समय खुला सूर्य प्रकाश आवश्यक होता है। फसल के बढ़ते समय २२° से. से अधिक तापमान तथा ५० से ८० सेमी. वर्षा उपयुक्त होती है।

रेगूर मिट्टी, शुष्क जलवायु वाले दक्षिण भारतीय पठार पर विस्तृत क्षेत्र में कपास पैदा की जाती है। महाराष्ट्र और मध्य प्रदेश



आकृति ९.४ भारत : कपास तथा पटसन उत्पादक क्षेत्र

के पड़ोसी जिले, गुजरात, पंजाब, हरियाणा, राज्यस्थान तथा दक्षिण के तमिलनाडु, कर्नाटक, आंध्र प्रदेश आदि में कपास पैदा होती है। देश के कुल कपास उत्पादक क्षेत्र का ३६% महाराष्ट्र में है।

कपास की श्रेणी उसके रेशे की लंबाई द्वारा निर्धारित होती है। भारत में छोटे रेशों की कपास अधिक पैदा होती है। आजकल बुरी, लक्ष्मी, वरलक्ष्मी तथा देवराज आदि मध्यम लंबे रेशों के कपास का उत्पादन सिंचाई की सहायता से किया जाता है।

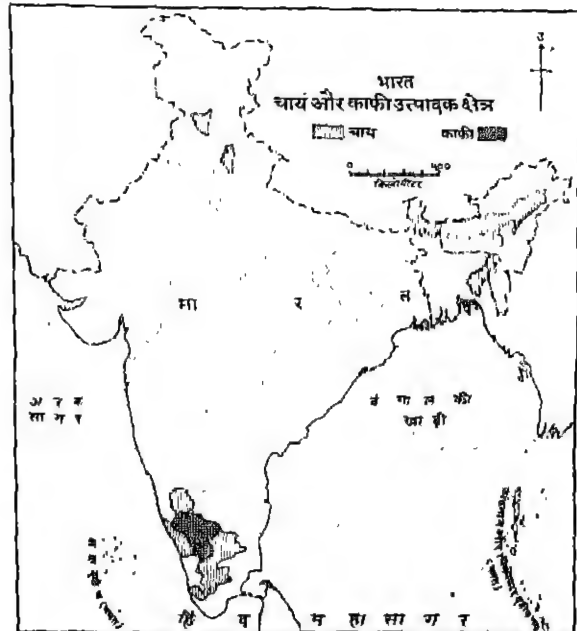
९. पटसन

कपास की तरह पटसन भी एक रेशे वाली फसल हैं। कपास कम वर्षा वाली; परंतु पटसन अधिक वर्षा वाली फसल है। पटसन से बोरे, गलीचे, रस्से तथा मोटे कपड़े बनाए जाते हैं।

पटसन उत्पादन के लिए उपजाऊ काँप की आवश्यकता होती है। प्रतिवर्ष बाढ़ द्वारा नए काँप की परत जिस क्षेत्र में जमा हो जाती है, वह क्षेत्र इस फसल के लिए सर्वोत्तम सिद्ध होता है। इसीलिए पश्चिम बंगाल राज्य में गंगा के डेल्टा में इसका उत्पादन अधिक होता है। इसके लिए उष्णार्द्र जलवायु आवश्यक होती है। २० से. से अधिक तापमान तथा २०० सेमी. वर्षा इस फसल के लिए आवश्यक है। फसल कटने के बाद उसके डंठलों को गलाने तथा रेशे धोने के लिए बड़ी मात्रा में पानी की आवश्यकता होती है। पश्चिम बंगाल के अतिरिक्त उड़ीसा, उत्तर प्रदश तथा त्रिपुरा राज्य में पटसन का उत्पादन होता है।

१०. चाय :

चाय उत्पादन में भारत का विश्व में प्रथम स्थान है। भारत में चाय की खेती पहले असम राज्य में ब्रह्मपुत्र की घाटी में की गई। आज भी देश के कुल उत्पादन की ४५ % चाय इन्हीं क्षेत्रों से उत्पादित होती है। पश्चिम बंगाल के उत्तरी जिले दार्जिलिंग, जलपाईगुडी तथा कूचबिहार चाय उत्पादन के लिए महत्वपूर्ण हैं। हिमाचल प्रदेश तथा शिवालिक पहाड़ी के क्षेत्रों में चाय की खेती की जाती है।



आकृति ९.५ भारत : चाय, काफी उत्पादक क्षेत्र

नीलगिरि पर्वतीय क्षेत्र में तमिलनाडु, केरल तथा कर्नाटक राज्य में चाय का उत्पादन होता है।

चाय के लिए वर्ष भर गरम और आर्द्र जलवायु आवश्यक होती है। सामान्यत: १५० सेमी. से अधिक वर्षावाले क्षेत्रों में यह पैदा होती है। अधिक पानी आवश्यक होने के साथ ही भूमि ढालू होनी चाहिए ताकि पानी पौधों की जड़ों में न लगे इसीलिए चाय की खेती पहाड़ी ढलानों पर की जाती है। ब्रह्मपुत्र की घाटी में पानी के अच्छे निकास वाली मिट्टी होने के कारण मंद ढलान के मैदानों में भी चाय के बगीचे हैं। चाय के लिए लौह तथा नाइट्रोजनयुक्त मृदा आवश्यक होती है। चाय के पौधे खूब ऊँचाई तक बढ़ सकते हैं; किन्तु पत्ते तोड़ने में कठिनाई होने के कारण तथा पौधों का घेरा बढ़ाने की दृष्टि से, जिससे अधिक-से-अधिक पत्तियाँ उपलब्ध हो सके, पौधों की समय-समय पर छँटाई की जाती है। चाय की पत्तियों को तोड़ने के लिए बड़ी संख्या में मजदूरों की आवश्यकता पड़ती है।

११. काफी :

काफी उत्पादन क्षेत्र केवल कर्नाटक, केरल तथा तमिलनाडु राज्यों में है। इन क्षेत्रों की लौहयुक्त जैविक लाल मिट्टी काफी के पौधों के लिए लाभदायक है। इसके लिए उच्च तापमान तथा १५० सेमी से अधिक वर्षा आवश्यक है। सूर्यकिरणों की तीव्रता से

संरक्षण के लिए काफी के बगीचों के चारों ओर छायादार ऊँचे पेड़ लगाए जाते हैं।

१२. रबर :

मोटरों, टैक्टरों तथा हवाई जहाजों के लिए टायर तथा ट्यूब की आवश्यकता होती है। ये वस्तुएँ रबर से बनाई जाती हैं। रबर उत्पादन के लिए २०० सेमी. से अधिक वर्षा चाहिए। भारत में केरल, कर्नाटक तथा तमिलनाडु केवल ये तीन ही राज्य रबर उत्पादक हैं। देश के रबर उत्पादन के संपूर्ण क्षेत्रफल का लगभग ९२% अकेले केरल राज्य में है।

हमने भारत की फसलों का अध्ययन किया। देश की अधिक जनसंख्या को देखते हुए भारतीय कृषि में खाद्यान्न- उत्पादन को अधिक महत्व प्राप्त है। आज विश्व व्यापार में इसके महत्व को देखते हुए देश में खाद्यान्न पर प्रक्रिया करने वाले कारखानों को स्थापित करना आवश्यक है। इस प्रकार कृषकों को उनके उत्पादन का अधिक मूल्य मिलेगा तथा देश में रोजगार के अधिक अवसर उपलब्ध होंगे। औद्योगिक फसलों, जैसे- कपास, पटसन, रबर आदि से संबंधित क्षेत्रों में उत्पादन बढ़ने से किसानों को अधिक लाभ मिल सकता है। विविध फसलों के लिए उत्तमकोटि के बीज उपलब्ध कराना आज की आवश्यकता है। अधिक उत्पादन पर ध्यान देने के साथ-साथ यह भी आवश्यक है कि अति सिंचाई तथा रासायनिक खादों के कारण मृदा की गुणवत्ता में न्यूनता न आए, इसका ध्यान रखना है।

स्वाध्याय

१. रिक्त स्थानों मे उचित शब्द लिखो :

क. चावल के उत्पादन में .... राज्य का प्रथम स्थान है।

ख. देश में .... वैज्ञानिक ज्ञान से गेहूँ के उत्पादन में यशस्वी वृद्धि हुई है।

ग. चाय का उत्पादन सबसे पहले .... राज्य में हुआ।

२. उचित जोड़ियाँ लगाओ :

'क' समूह (फसलें)	'ख' समूह (सर्वाधिक उत्पादक राज्य)
च. गेहूँ	१. केरल
छ. तेलहन	२. उत्तर प्रदेश
ज. ज्वार	३. हिमाचल प्रदेश
झ. रबर	४. महाराष्ट्र
	५. गुजरात

३. निम्नांकित प्रश्नों के एक-एक वाक्य में उत्तर लिखो :

ट. देश में चावल का प्रति हेक्टर सर्वाधिक उत्पादन किस राज्य में होता है ?

ठ. किन फसलों से भूमि को नाइट्रोजन की पूर्ति होती है ?

ड. कापी के बगीचों के संरक्षण के लिए कौन-सा उपाय किया जाता है ?

४. कारण लिखो :

त. ब्रहमपुत्र नदी की घाटी में चाय के बगीचे मिलते हैं।

थ. मसाले की फसलों का आर्थिक महत्व है।

द. गेहूँ रबी की फसल है।

ध. कम वर्षा होने के बावजूद पंजाब के चावल उत्पादक क्षेत्र में वृद्धि हुई है।

५ भारत के चावल उत्पादक क्षेत्र दर्शक मानचित्र का पठन कर निम्नांकित के उत्तर लिखो : (आकृति ९.१)

प. भारत के किस भाग में प्रमुख चावल उत्पादक क्षेत्र हैं ?

फ. महाराष्ट्र के किस भाग में चावल पैदा किया जाता है ?



फसलों पर फौवारा



रबर : दूध एकत्रित करना

प्रकरण १०

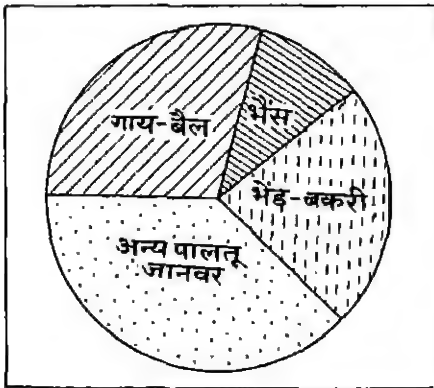
पशुसंपत्ति

पशुपालन भारतीय कृषि का एक पूरक व्यवसाय है। पूर्व काल से देश में सर्वत्र पशुओं का उपयोग कृषिकार्य तथा बोझ ढोने के लिए होता रहा है। पशुओं से खेती के लिए आवश्यक खाद मिलती है। दुधारू पशु पालकर कृषक अपने परिवार की आय बढ़ाने का प्रयास करता है। प्राचीनकाल से ही भारतीय समाज में पशु को संपत्ति माना गया है। इसी कारण गोधन, गजधन, अश्वधन आदि शब्द पशुओं के लिए प्रयुक्त होते रहे हैं। इस प्रकार हम पशुओं के प्रति आदर की भावना व्यक्त करते हैं।

पशुओं का भौगोलिक वितरण :

पशुपालन के लिए साधारणतः शुष्क जलवायु आवश्यक होती है। भारत के साधारण वर्षा वाले राजस्थान तथा उसके पड़ोसी राज्यों में पशुओं की संख्या अधिक है। संसार में सामान्यतः चराई के क्षेत्र रेगिस्तानी प्रदेशों के पास पाए जाते हैं।

भारत के प्रमुख पशुपालन क्षेत्र उत्तर प्रदेश, राजस्थान, महाराष्ट्र, गुजरात, मध्य प्रदेश, पंजाब आदि राज्यों में हैं। इसके विपरीत अधिक वर्षा वाले असम, पश्चिम बंगाल, बिहार, उड़ीसा तथा केरल राज्यों में पशुओं की संख्या कम पाई जाती है तथा ये निम्नकोटि के होते हैं।



आकृति १०.१ भारत : पशुसंपत्ति

भारत में जिस प्रकार प्रत्येक दस वर्ष में जनगणना की जाती है, उसी प्रकार प्रत्येक पाँच वर्ष में पशुगणना की जाती है।

भारत में प्रमुख पशु-प्रकार :

इसमें गाय-बैल, भैंस-भैंसा, भेंड़-बकरियाँ, मुर्गी-बत्तख, घोड़े-खच्चर आदि विभाग किए जाते हैं। ये सभी पालतू पशु हैं।

गाय-बैल :

भारत जैसे कृषिप्रधान देश में खेती के कामके लिए बैलों का बड़े पैमाने पर उपयोग किया जाता है। भारत में गाय-बैलों की संख्या उत्तर प्रदेश, उत्तरांचल, मध्य प्रदेश, छत्तीसगढ़, महाराष्ट्र, गुजरात, राजस्थान, बिहार, आंध्र प्रदेश आदि राज्यों में अधिक है। इस राज्यवार वितरण से स्पष्ट होता है कि दक्षिण भारत की अपेक्षा उत्तर भारत में गाय-बैलों की संख्या अधिक है। भारत में गीर, साहीवाल, सिंधी तथा देवनी प्रजाति की अधिक दूध देने वाली गाएँ पाई जाती हैं। आज दूध उत्पादन के लिए संकरित गायों का अधिक महत्व है। अन्य देशों की तुलना में भारत में गाय-बैलों की संख्या सबसे अधिक है।

भैंस-भैंसा :

संसार में भैंस-भैंसों की संख्या की दृष्टि से भारत अग्रणी देश है। देश में कुल दूध-उत्पादन में भैंस के दूध की मात्रा अधिक है।

भैंसा कृषि तथा बोझ ढोने के काम आता है। हरियाणा तथा पंजाब में मुर्रा जाति की भैंसें दूध उत्पादन के लिए प्रसिद्ध हैं। इसके अतिरिक्त जाफराबादी, महिसाणा तथा नीलीराबी जाति की भैंसें अधिक दूध देने के लिए प्रसिद्ध हैं।

भेड़-बकरी :

बकरी पालन में कम खर्च होता है, अतः इसे गरीबों की गाय कहते हैं। आकार में छोटी होने के कारण कम स्थान घेरने वाली, छोटी घास तथा कँटीली झाड़ियाँ खाने वाली, दूध, मांस, चमड़ा तथा खाद देने वाली बकरी बड़े जीवट की पशु है। आज मांस के लिए बकरियों का अधिक उपयोग किया जाता हैं। देश में सर्वत्र बकरियाँ पाई जाती हैं; किंतु कम वर्षा वाले ऊँचे, पठारी तथा पर्वतीय भागों में इनकी संख्या अधिक पाई जाती है। बकरियाँ, गुजरात तथा राजस्थान राज्यों के अतिरिक्त, महाराष्ट्र, आंध्र प्रदेश,कर्नाटक, तमिलनाडु आदि राज्यों में अधिक पाई जाती हैं।

हिमालय में बकरियों के बाल सफेद तथा मुलायम होते हैं। वहाँ इन्हें चंबा तथा गुड्डी नाम से जाना जाता है। यमुना तथा चंबल नदी क्षेत्र की बकरियों को जमुना-पारी कहते हैं। महाराष्ट्र की सुरती जाति की बकरियाँ प्रसिद्ध हैं।

भेंड़ों का उपयोग मुख्यतः ऊन तथा मांस उत्पादन के लिए किया जाता है। भेंड़ों की बड़े पैमाने पर संख्या आंध्र प्रदेश, राजस्थान, तमिलनाडु, कर्नाटक, महाराष्ट्र आदि राज्यों में पाई जाती हैं।

कश्मीर की *'पश्मीना'* जाति से प्राप्त हुई ऊन बहुत मुलायम होता है। इसकी तुलना में दक्षिण भारत से प्राप्त ऊन मोटा होता है। भारत में ऊन से कंबल, कालीन तथा ऊनी कपड़े बनाए जाते हैं।

पशुपालन की समस्या :

संसार में सबसे अधिक पशुओं की संख्या भारत में होने के बावजूद ये निकृष्टकोटि के हैं। कुपोषण तथा बीमारियों के कारण

ये और अधिक निकृष्ट होते जा रहे हैं, जिससे ये कम मात्रा में दूध देते हैं। कुपोषण का प्रमुख कारण चारे की कमी तथा उसका प्रकार है। भारत में चारागाहों की संख्या कम है। बंजर भूमि तथा खेती के लिए अनुपयुक्त भूमि का उपयोग यहाँ चारगाह के लिए किया जाता है। पशुओं को सूखा चारा तथा कृषि की बची अन्य बेकार वस्तुओं को खिलाया जाता है। चारे की फसलें बहुत कम उगाई जाती हैं; कारण अधिकांश भूमि का उपयोग खाद्यान्न फसलों के लिए होता है। खेत के लिए भूमि की कमी के कारण चारे के उत्पादन के लिए अलग से प्रधानता नहीं दी जा सकती है।

कुपोषित पशु बीमारी से जल्दी ही मर जाते हैं। प्रति वर्ष हजारों पशु महामारी का शिकार हो जाते हैं। खुरमुँही, घटसर्प, पोंकनी आदि रोगों से भारत में पशु मरते हैं।

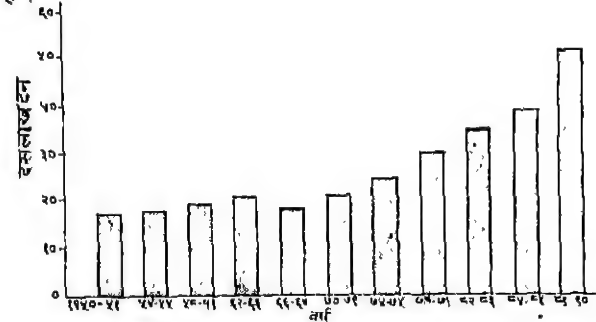
पूर्व काल से ही भारतीय समाज में पशुओं के प्रति कृतज्ञता की भावना होने के कारण यहाँ रोगी, बूढ़े तथा अनुपयोगी पशुओं की संख्या अधिक है। इन पशुओं को खिलाना-पिलाना ही इस व्यवसाय की प्रमुख समस्या है।

पशु-विकास :

अब सूखे चारे तथा बेकार वस्तुओं को पशुओं को खिलाने की मात्रा धीरे-धीरे कम हो रही है। देश में किसान, 'लुर्सन','हे' तथा 'अल्फाफा' आदि घासों को पैदा करके हरा चारा उपलब्ध कराने का प्रयत्न कर रहा है। महाराष्ट्र के कुछ भागों में कड़वल नामक गर्मी की फसल पैदा की जाती है। तिलहन से तेल निकालने पर बचे पदार्थ 'खली' को दुधारू पशुओं को खिलाया जाता है। दलहन से भी पशुखाद्य तैयार किया जाता है। लोगों को जानकारी हो गई है कि पशुओं को भी संतुलित आहार चाहिए।

वैज्ञानिक शोध से पशुओं की जाति सुधारने का प्रयत्न किया जा रहा है। उत्पादक पशुओं का वैज्ञानिक विधि से पालन-पोषन करके आज बड़े पैमाने पर उच्चकोटि के पशु पैदा किए जाते हैं। ऐसा प्रयत्न किया जा रहा है कि प्रत्येक तालुका स्थान पर पशुओं का औषधालय हो।

स्वतंत्रता के बाद दूध-उत्पादन पर विशेष ध्यान केंद्रित हुआ है। इसके लिए दूध व्यवसाय करने की इच्छा रखने वाले लोगों को उत्तम जाति की गाय-भैंस, उनके लिए सुधारित पशु आहार तथा अन्य काम के लिए पूँजी दी जाती हैं। देश में पशु-चिकित्सा केंद्र स्थापित किए गए हैं। आज देश में पंद्रह हजार से अधिक पशु-चिकित्सा केंद्र हैं। दूध उत्पादन में उत्तर प्रदेश, पंजाब, राजस्थान, मध्य प्रदेश, आंध्र प्रदेश, गुजरात, तमिलनाडु तथा महाराष्ट्र अग्रणी हैं।



आकृति : १०.२ : भारत : दुग्ध उत्पादन

भारत सरकार ने **'दूध की बाढ़'** योजना द्वारा दूध उत्पादन को गतिशील बनाने का प्रयत्न किया है। इसका मुख्य उद्देश्य शहरी उपभोक्ता क्षेत्रों को ग्रामीण दूध उत्पादक क्षेत्रों से जोड़कर दूध-उत्पादकों को दूध का उचित मूल्य दिलाना है। देश में सभी लोगों के आहार में दूध तथा दुग्धजन्य पदार्थो की मात्रा बढ़ना तथा ग्रामीण भागों में रोजगार उपलब्ध कराना भी इस योजना का उद्देश्य है।

पशुसंपत्ति संधारण (संरक्षण - संवर्धन) :

पशु पुनर्निर्माण होने वाली संपत्ति है। मानव के आर्थिक विकास के लिए पशुओं का बहुत महत्व है। इसके अतिरिक्त अनेक प्राणिज उत्पादनों के सहारे लोगों की आय बढ़ जाती है तथा इनका निर्यात करके विदेशी मुद्रा अर्जित की जाती है। अतः पशुओं की देखभाल करना हमारा कर्तव्य बन जाता है। सामान्य जनता को पशुओं का महत्व समझाने तथा देखभाल के व्यवस्थित तरीके बताने के उद्देश्य से स्थान-स्थान पर पशुओं की प्रदर्शनी लगाई जाती है। प्रोत्साहन के लिए अच्छे पशु पुरस्कृत किए जाते हैं।

संधारण के अंतर्गत सबसे महत्वपूर्ण कार्य दुधारू पशुओं को पर्याप्त मात्रा में उत्तम आहार तथा पानी उपलब्ध कराना होता है। पशु-चिकित्सा केंद्रों में वृद्धि होनी चाहिए। इससे रोगों पर नियंत्रण होगा तथा विविध कामों के लिए अच्छे पशु मिल सकेंगे। आर्थिक दृष्टि से पशुसंपत्ति का संधारण करना आवश्यक है।

स्वाध्याय

१. रिक्त स्थानों में उचित शब्द लिखो :

क. पंजाब में .... जाति की भैंसें दुग्ध-उत्पादन के लिए प्रसिद्ध हैं।

ख. भारत में पशुगणना प्रति .... वर्ष में होती है।

२. उचित जोड़ियाँ लगाओ :

'क' समूह	'ख' समूह
च. महिसाना	१. बकरी
छ. जमुना-पारी	२. भेड़
ज. साहीवाल	३. भैंस
	४. गाय

३. निम्नांकित प्रश्नों के उत्तर एक-एक वाक्य में लिखो :

१. हरियाणा में भैंस की कौन-सी जाति दूध देने के लिए प्रसिद्ध है ?

२. किस राज्य में गाय-बैलों की संख्या सर्वाधिक है ?

३. महाराष्ट्र में किस जाति की बकरियाँ प्रसिद्ध हैं ?

४. निम्नांकित प्रश्नों के उत्तर लिखो :

त. पशुपालन की कौन-सी प्रमुख समस्या है ?

थ. भारत में दुग्ध उत्पादन के लिए कौन-से प्रयत्न किए गए हैं।

द. 'दूध की बाढ़' योजना का क्या अर्थ है ?

ध. पशुसंपत्ति संधारण के विविध उपाय लिखो।

प्रकरण ११

मत्स्योद्योग

मछली पकड़ने का व्यवसाय प्राचीनकाल से किया जाता है। पहले शिकार तथा मछली पकड़ने का काम मात्र जीवनयापन के लिए किया जाता था। समय के साथ जीवनयापन के लिए प्राचीन व्यवसाय शिकार करना लगभग समाप्त हो गया है। मात्र मछली पकड़ने का व्यवसाय प्रचलित है,जिनका आधुनिकीकरण हो गया है।

भारत को ७५१७ किमी. लंबाई का समुद्री तट उपलब्ध है। इसके अतिरिक्त भूभाग पर नदियाँ, झीलें, तालाब तथा अनेक जलाशय हैं। अतः समुद्रों तथा देश के आंतरिक भागों में मछली पकड़ने का व्यवसाय चलता है।

भारत के तटवर्ती प्रदेशों में रहने वालों का मुख्य भोजन चावल तथा मछली है। मछली अधिक प्रोटीनयुक्त खाद्य है। मछलियों से तेल निकाला जाता है। इसी प्रकार इनका उपयोग मुर्गियों के लिए खाद्य पदार्थ तथा खाद बनाने के लिए किया जाता है। भारत जैसे सघन जनसंख्या वाले देश में मछली पूरक आहार के रूप में उपयुक्त है।

अनुकूल परिस्थिति :

सागर तटों के समीप महाद्वीपीय भग्नतट पर मछलियों का विकास खूब होता है। प्राकृतिक बंदरगाहों के लिए कटे-फटे समुद्रीतट आवश्यक होते हैं। ऐसे बंदरगाह मत्स्योद्योग के लिए उपयोगी होते हैं। तटीय प्रदेश में वन होने पर नाव तथा जहाज बनाने के लिए लकड़ी उपलब्ध हो जाती है। नदियों द्वारा सागरों को जैव तथा नाइट्रोजन युक्त जल की पूर्ति होती है। इस प्रकार नदियों के मुहानों पर तथा खुले समुद्रों में बड़ी मात्रा में मछली पकड़ने का व्यवसाय होता है। 'प्लंकटन' नामक मछलियों का खाद्य-पदार्थ तैयार होने के लिए सूर्य किरणों का सागर तल तक पहुँचना आवश्यक होता है। इस प्रकार की अनुकूल परिस्थिति में भारत के तटीय भागों में मछली पकड़ने का व्यवसाय होता है। व्यापारिक मत्स्योद्योग के लिए यंत्रचालित बड़ी नावों, उत्तम जाल, मछलियों पर प्रक्रिया करने के केंद्र तथा शीतगृह आदि की आवश्यकता होती है। साथ ही यातायात के तेज साधनों की आवश्यकता होती है, जिससे मछलियों को शीघ्रातिशीघ्र बाजारों तक पहुँचाया जा सके।

भारत में मत्स्योद्योग के आंतरिक तथा सागरीय दो प्रकार हैं।

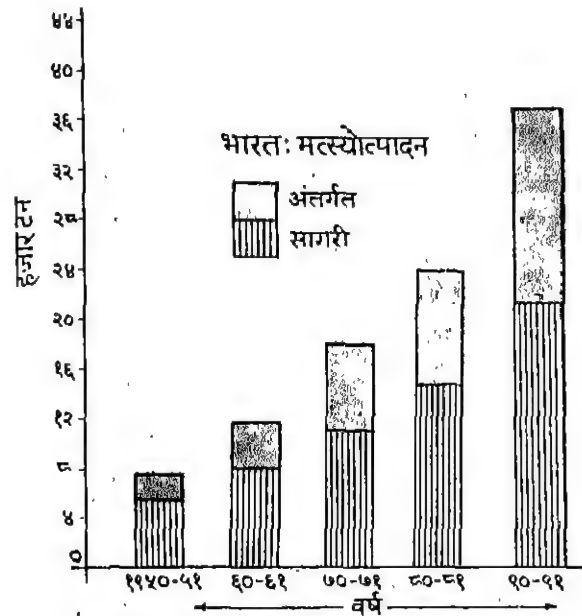
आंतरिक मत्स्योद्योग :

नदी, सरोवर, तालाब, नहर तथा बाँधों से तैयार जलाशयों आदि में मछली पकड़ने का काम चलता है। इसको मीठे जल का मत्स्योद्योग कहते हैं। चिल्का तथा पुलिकत जैसी खारे पानी की झीलों में भी मत्स्योद्योग होता है।

रोहू, कटला, कलवासु, मरल, आदि मछलियाँ आंतरिक मत्स्योद्योग में पाई जाती हैं।

पश्चिम बंगाल, उड़ीसा, आंध्र प्रदेश आदि आंतरिक मत्स्योद्योग के प्रमुख राज्य हैं। इनके अतिरिक्त बिहार, उत्तर प्रदेश, मध्य प्रदेश तथा महाराष्ट्र भी इस उद्योग के लिए प्रसिद्ध हैं। देश में पश्चिम बंगाल आंतरिक मत्स्योद्योग के लिए अग्रणी है।

स्वतंत्रता के बाद आंतरिक मत्स्योद्योग विकास के लिए विशेष प्रयत्न किए गए। इसको प्रोत्साहित करने के लिए शासन द्वारा आर्थिक सहायता दी जाती है। बाँधों के जलाशयों में उत्तम मछली के बीज छोड़कर उचित व्यवस्था द्वारा अधिक मात्रा में मत्स्य-उत्पादन किया जाता है। इसको मत्स्य-कृषि कहते हैं। पिछले चालीस वर्षों में देश के आंतरिक तथा सागरी मत्स्योद्योग में हुई वृद्धि आकृति में दिखाई गई है।



आकृति ११.१ : भारत : मत्स्योत्पादन

कुल मत्स्योत्पादन का लगभग ४०% उत्पादन मत्स्योद्योग से होता है।

सागरी मत्स्योद्योग :

सागरी मछली पकड़ने का काम पूर्वी तथा पश्चिमी समुद्र तटों एवं गहरे समुद्रों में किया जाता है। गंगा के मुहाने से गुजरात के तटों तक मछली पकड़ने का काम होता है। किनारों पर हेरिंग, सारंग, घोल, बोंबिल, रावस, सुरमई, पापलेट, तूना इत्यादि मछलियाँ पाई जाती हैं।

तटों से दूर गहरे सागरों में यांत्रिक नौकाओं का उपयोग कर, मछली पकड़ने का काम होता है। इसमें मुख्यत: बंगाल की खाड़ी में अंदमान-निकोबार द्वीप समूह के समीप के सागर तथा अरब सागर में लक्षद्वीप के समीप के सागर मछली पकड़ने के प्रमुख क्षेत्र हैं। सागरी मत्स्योद्योग में महाराष्ट्र अग्रणी है। केरल, गोआ, कर्नाटक तथा तमिलनाडु के सागरीय भाग मछली पकड़ने की दृष्टि से महत्वपूर्ण हैं।

इसके पूर्व लोगों द्वारा कृषि से खाद्यान्न उत्पादन कर अपना जीवनयापन करने के कारण भारत में मत्स्योद्योग पर ध्यान नहीं दिया गया। उष्ण जलवायु होने के कारण भारत में मछलियों को सँभाल रखना एक समस्या है। साथ ही यहाँ पर मछलियों के लिए बाजार भी अनुकूल नहीं हैं।

भारत सरकार ने खुले सागरों में मछली पकड़ने को प्रोत्साहित करने के लिए मंगलूर, कोचीन, चेन्नई, विशाखापट्टम, पोर्टब्लेअर आदि बंदरगाहों पर सुविधाएँ उपलब्ध कराई हैं। मत्सयशाला प्रारंभ कर उसमें इस व्यवसाय का प्रशिक्षण तथा आधुनिक साधनों की जानकारी दी जाती है। जाल बनाने के लिए टिकाऊ तथा कृत्रिम धागों का उपयोग किया जाता है। इन सभी सुविधाओं के कारण मत्स्य उत्पादन में निश्चित रूप से वृद्धि हुई है।

मत्स्योद्योग के संतुलित विकास के लिए शासन प्रयत्नशील है। इसके लिए "राष्ट्रीय मत्स्य-बीज विकास प्रकल्प" की स्थापना की गई है। मछली पकड़ने के व्यवसाय में लोगों के लिए प्रशिक्षण संस्था और वित्त सहायक संस्था स्थापित की गई हैं। इनके अनुसार मछुवारों की सुरक्षा के लिए समय-समय पर आने वाले तूफानों की पूर्व सूचना ऋतु विभाग द्वारा संचार माध्यमों से दी जाती है। भविष्य के लिए राष्ट्रीय कल्याण निधि योजना तथा सामूहिक बीमा योजना प्रारंभ की गई है। इनके कारण मत्स्य-उत्पादन में लक्षणीय वृद्धि हुई है। आजकल भारत मछली का निर्यात भी करने लगा है। इसके निर्यात में अत्यधिक वृद्धि हुई है।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :
   - क. आंतरिक मत्स्योद्योग में............राज्य अग्रणी है।
   - ख. मछुवारों की सुरक्षा के लिए तथा उनके भविष्य के लिए तथा............योजना प्रारंभ की गई है।
   - ग. सागरीय मत्स्योद्योग में ....राज्य अग्रणी है।

२. निम्नांकित प्रश्नों के एक-एक वाक्य में उत्तर लिखो :
   - घ. मत्स्य-कृषि का क्या अर्थ है ?
   - छ. भारत के पूर्वी तट पर किस झील में मत्स्योद्योग होता है ?

३. निम्नांकित प्रश्नों के संक्षिप्त उत्तर लिखो :
   - ट. राष्ट्रीय मत्स्य-बीज-विकास प्रकल्प का महत्व लिखो।
   - ठ. भारत सरकार ने खुले सागरों में मछली पकड़ने तथा प्रोत्साहन देने के लिए कौन-सी योजना बनाई है ?
   - ड. भारत में मछली पकड़ने का व्यवसाय क्यों कम विकसित हुआ है?

(आ)

मछुवारों के यहाँ जाकर उनके व्यवसाय के संबंध में जानकारी एकत्र करो। उनके द्वारा पकड़ी जाने वाली मछलियों के नाम लिखो।

* * *

प्रकरण १२

खनिज संपत्ति

यद्‌यपि मानव प्राचीनकाल से खनिजों का उपयोग करता आरहा है; किंतु औद्‌योगिक क्रांति के बाद इनका उपयोग बहुत तीव्र गति से बढ़ा है । यंत्रों का निर्माण करने के लिए खनिज पदार्थों की आवश्यकता होती है । अतएव औद्‌योगिक प्रगति में खनिजों का महत्वपूर्ण योगदान है । इसलिए खनिज पदार्थ महत्वपूर्ण प्राकृतिक संपत्ति मानी जाती है ।

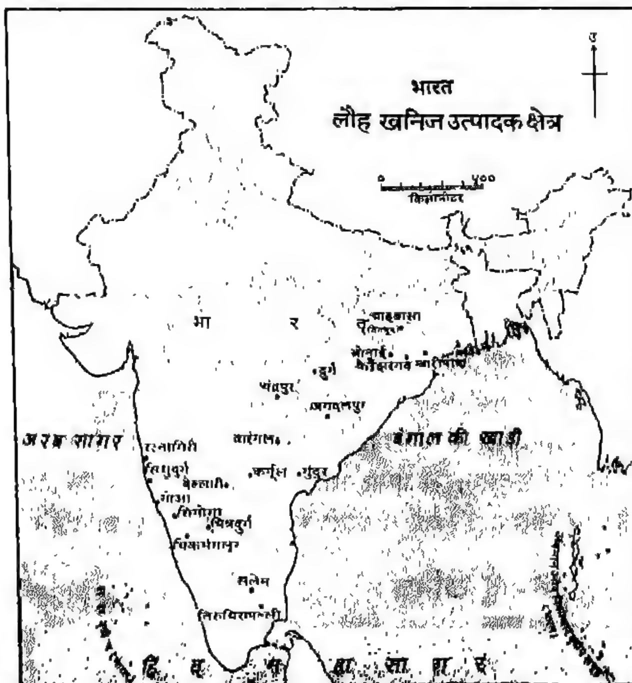
गुणधर्म के अनुसार खनिज पदार्थ धातु तथा अधातु दो प्रकार के होते हैं । ऊर्जा देने वाले खनिजों का एक अलग प्रकार किया जाता है । धातु खनिज मुख्यत: अग्निज तथा रूपांतरित चट्‌टानों में पाए जाते हैं । लोहा, मैंगनीज, बाक्साइट, सोना, ताँबा, चाँदी, निकेल, सीसा, ज़स्ता, टिन, टंगस्टन आदि धातु खनिज हैं । जिप्सम, चूने का पत्थर, हीरा, डोलोमाइट, पोटाश, कैलसाइट, ग्रेफाइट, कायनाइट आदि अधातु खनिज हैं । खनिज तेल तथा कोयला अधातु ऊर्जा खनिज के रूप में जाने जाते हैं ।

भारत में विविध प्रकार के खनिज पाए जाते हैं । कुछ खनिज बड़ी मात्रा में तथा कुछ बहुत कम मात्रा में पाए जाते हैं । कुछ क्षेत्र खनिजों से समृद्‌ध हैं तो कुछ क्षेत्रों में खनिजों का अभाव है । हम यहाँ कुछ महत्वपूर्ण खनिजों तथा उनके भारत में वितरण पर विचार करेंगे ।

धातु खनिज-

लौह खनिज :

लोहे का उपयोग लौह-इस्पात बनाने में होता है । लौह-इस्पात वर्तमान यंत्रयुग का आधार है । भारत में मैग्नेटाइट, हेमेटाइट तथा लिमोनाइट प्रकार का लोहा पाया जाता है । भारत में हेमेटाइट प्रकार के लोहे का बहुत बड़ा भंडार है ।

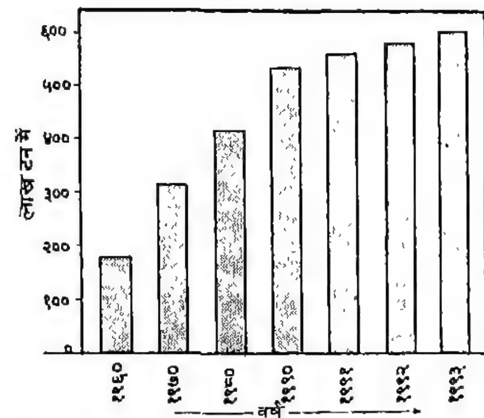


चित्र १२.१ भारत-लौह खनिज उत्पादक क्षेत्र

झारखंड में कच्चे लोहे का उत्पादन मानभूमि तथा पश्चिम सिंहभूमि जिलों के चैबासा क्षेत्र में होता है । उड़ीसा के केंउँझरगढ़, मयूरभंज तथा बोनई क्षेत्र कच्चा लोहा उत्पादन के लिए प्रसिद्‌ध हैं । देश के संपूर्ण लौह उत्पादन का ५०% से अधिक उत्पादन बिहार, झारखंड तथा उड़ीसा में होता है ।

इन राज्यों का उत्पादित कच्चा लोहा समीपवर्ती, जमशेदपुर, दुर्गापुर, बोकारो, रूरकेला तथा आसनसोल के लौह-इस्पात कारखानों को भेज दिया जाता है । छत्तीसगढ़ में दुर्ग तथा बस्तर जिले में लोहे की खानें पाई जाती हैं । यहाँ का कच्चा लोहा भिलाई के लौह-इस्पात कारखाने में काम आता है । महाराष्ट्र में चंद्रपुर, रत्नागिरी तथा सिंधुदुर्ग जिलों में लोहे के भंडार पाए जाते हैं । इनके अतिरिक्त आंध्र प्रदेश के कृष्णा, कर्नूल, वारंगल तथा गुंटूर जिलों में, तमिलनाडु के सेलम तथा तिरुचिरापल्ली में, कर्नाटक के शिमोगा, बेल्लारी, चित्रदुर्ग तथा चिकमंगलूर जिलों में लौह खनिज का उत्पादन होता है ।

स्वतंत्रता के बाद लौह खनिज के उत्पादन में खूब वृद्‌धि हुई है, इसकी जानकारी हम निम्न आकृति द्‌वारा प्राप्त कर सकते हैं । देश में तथा विदेशों में लौह खनिज की बहुत माँग है । देश के लौह-इस्पात कारखानों की माँग की पूर्ति करने के बाद भारत लौह खनिज का बहुत बड़ी मात्रा में विदेशों को निर्यात भी करता है ।



चित्र १२.२ : भारत-लौह खनिज उत्पादन

मैंगनीज :

मैंगनीज मुख्यत: इस्पात बनाने में प्रयुक्त होता है । इसके अतिरिक्त रंग, काँच के सामान तथा रसायन उद्‌योग में भी इसका उपयोग होता है ।

भारत में मैंगनीज का बहुत बड़ा भंडार है । इसके भंडार सामान्यत: लोहे के भंडार के समीप ही पाए जाते हैं । उत्तमकोटि

के मैंगनीज के बृहद् भंडार उड़ीसा, कर्नाटक, मध्य प्रदेश, महाराष्ट्र, गोआ, आंध्र प्रदेश, झारखंड आदि राज्यों में हैं।



चित्र १२.३ भारत : मैंगनीज उत्पादक क्षेत्र

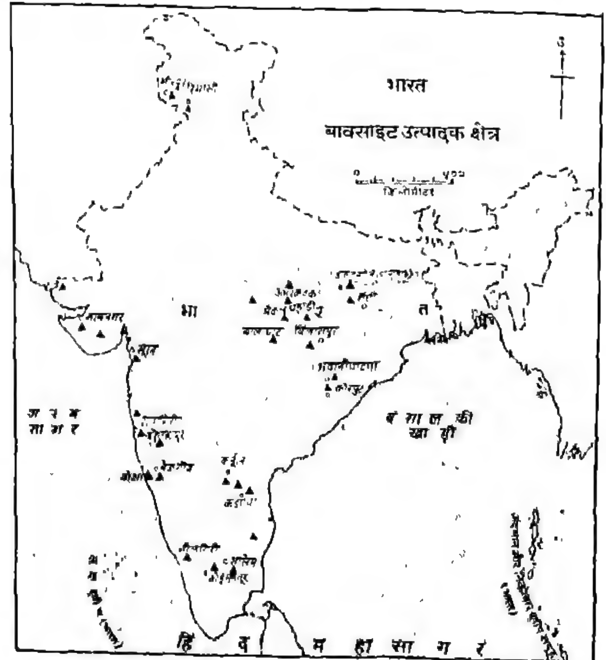
उड़ीसा में केऊँझरगढ़, मयूरभंज, तालचेर तथा सुंदरगढ़; कर्नाटक में शिमोगा, चित्रदुर्ग, बेल्लारी तथा उत्तरी कन्नडा; मध्य प्रदेश में छिंदवाड़ा तथा बालाघाट; महाराष्ट्र में नागपुर एवं भंडारा, आंध्र प्रदेश में श्री काकुलम; झारखंड में पश्चिम सिंहभूमि जिला तथा गोआ राज्य में मैंगनीज के भंडार हैं।

पहले भारत से मैंगनीज का बहुत बड़ी मात्रा में निर्यात होता था; किंतु अब देश में ही लौह-इस्पात उद्योग के विकास के कारण इसके उत्पादन का अधिकांश लौह यहीं पर उपयोग में लाया जाता है। शेष खनिज का निर्यात किया जाता है।

बाक्साइट :

बाक्साइट से अल्युमिनियम नामक धातु प्राप्त होती है। अल्युमिनियम का उपयोग बरतन, विमान, मोटर-गाड़ियों के पुर्जे तथा जलयान निर्माण में होता है। उत्तम विद्युत सुचालक होने के कारण अल्युमिनियम का उपयोग विद्युत उपकरण तथा विद्युत संवहन के लिए होता है।

देश में बाक्साइट के विपुल भंडार हैं। बाक्साइट उत्पादक प्रमुख राज्य - मध्य प्रदेश, बिहार, गुजरात, महाराष्ट्र, कर्नाटक, तमिलनाडु, गोआ तथा उत्तर प्रदेश है। मध्य प्रदेश में बालाघाट तथा छत्तीसगढ़ राज्य के बिलासपुर जिलों में बाक्साइट का उत्पादन होता है। झारखंड में राँची व पालामऊ जिलों में तथा गुजरात में जामनगर व सूरत जिलों में बाक्साइट की खानें हैं। महाराष्ट्र में कोल्हापुर तथा रत्नागिरी जिलों में बाक्साइट पाया जाता है। कर्नाटक के बेलगाँव जिले में तथा गोआ राज्य में भी इसका उत्पादन होता है। तमिलनाडु के सेलम तथा कोयंबटूर जिलों में इसकी खाने हैं।



चित्र १२.४ : भारत : बाक्साइट उत्पादक क्षेत्र तथा अल्युमिनियम उत्पादक केंद्र

अन्य धातु खनिज :

ताँबा :

ताँबे से प्राप्त धातु जंगरहित तथा उत्तम विद्युत सुचालक होती है। ताँबा मुलायम होता है। अतः मिश्र धातु बनाने में इसका उपयोग किया जाता है। बिजली के तार तथा उपकरण बनाने के लिए यह बहुत उपयोगी है।

ताँबा खनिज का सबसे अधिक उत्पादन झारखंड राज्य में होता है। इस राज्य के पश्चिम सिंहभूमि तथा हजारीबाग जिलों में ताँबा का उत्पादन होता है। मोसाबनी इस क्षेत्र का सबसे प्रमुख उत्पादक केंद्र है। इसके अलावा राजस्थान में झुनुझुनुन और अल्वार क्षेत्र ताँबा के उत्पादन में महत्वपूर्ण हैं। इनके अतिरिक्त उत्तरांचल में गढ़वाल, आंध्र प्रदेश में गुंटूर, नेल्लोर; तमिलनाडु में कोयंबटूर ताँबे की खानों के लिए प्रसिद्ध हैं। कर्नाटक के चित्रदुर्ग और गुलबर्गा जिलों में भी ताँबा पाया जाता है। भारत में तांबे का सीमित भंडार होने के कारण इसके स्थान पर अल्युमिनियम का उपयोग किया जाता है।

आजतक कर्नाटक में कोलार तथा हट्टी की खानों से सोने का उत्पादन होता था। अब गडग जिले में भी यह धातु पाई जाती है। आंध्र प्रदेश के अनंतपुर जिले में अल्प मात्रा में सोना पाया जाता है। राजस्थान में सीसा तथा जस्ता खनिजों का उत्पादन होता है और भीलवाड़ा जिले में थोड़ी मात्रा में चाँदी पाई जाती है।

अधातु खनिज :

अभ्रक :

अभ्रक विद्युत कुचालक खनिज है। विद्युत उपकरण, औषधि तथा रंग-उद्योग में इसका उपयोग किया जाता है।

भारत का अधिकांश अभ्रक बिहार, झारखंड, आंध्रप्रदेश तथा राजस्थान की खानों से आता है। देश के कुल उत्पादन का ५०% से अधिक अभ्रक बिहार और झारखंड राज्यों में होता है। झारखंड राज्य में हजारीबाग और बिहार के गया तथा मुंगेर क्षेत्र अभ्रक उत्पादन के लिए प्रसिद्ध हैं। आंध्र प्रदेश में नेल्लोर तथा गुदूटुर जिलों में इसका उत्पादन होता है। राजस्थान में उदयपुर से अजमेर तक अभ्रक का विस्तृत क्षेत्र है तथा भीलवाड़ा प्रमुख उत्पादक केंद्र है। प्लास्टिक तथा अन्य कृत्रिम वस्तुओं का पर्याय के रुप में प्रयोग होने के कारण अभ्रक की माँग में गिरावट आई है।

जिप्सम :

यह खनिज स्तरित चट्टानों में पाया जाता है। इसका उपयोग सीमेंट तथा रासायनिक खाद बनाने में होता है। भारत में जिप्सम के संपूर्ण उत्पादन का ७५% राजस्थान के बीकानेर, जोधपुर तथा जैसलमेर क्षेत्रों से प्राप्त होता है। तमिलनाडु, आंध्र प्रदेश, उत्तर प्रदेश, गुजरात आदि राज्यों में कुछ मात्रा में जिप्सम प्राप्त होता है।

सेंधा नमक :

सेंधा नमक को 'खनिज नमक' भी कहा जाता है। यह खनिज मुख्यतः राजस्थान में साँभर सरोवर के परिसर में तथा हिमालय प्रदेश के मंडी जिले में होता है।

चूने का पत्थर :

सीमेंट बनाने तथा कच्चे लोहे को शुद्ध करने के लिए चूने के पत्थर का मुख्यतः उपयोग होता है। मध्य प्रदेश, छत्तीसगढ़, महाराष्ट्र तमिलनाडु, उड़ीसा तथा कर्नाटक आदि राजों में चूने के पत्थर का बड़े पैमाने पर उत्पादन होता है।

हीरा :

भारत में हीरे की खाने मध्य प्रदेश के पन्ना तथा सतना में और उत्तर प्रदेश के मिर्जापुर जिले में हैं। पन्ना के हीरे प्रसिद्ध हैं। तराशे गए हीरों की अंतर्राष्ट्रीय बाजार में बहुत माँग है।

मोनाजाइट :

केरल तथा तमिळ्नाडु राज्य के समुद्री किनारों पर मोनाजाइट खनिज मिलता है। इसमें अणु-ऊर्जा खनिज थोरियम पाया जाता है। झारखंड के चैबासा तथा हिमाचल प्रदेश राज्य में यूरोनियम पाया जाता है।

भारत में खनिज उत्पादन की दिशा :

बिहार और झारखंड खनिज उत्पादन में अग्रणी रहे हैं। छोटा नागपुर का पठार अनेक प्रकार की खनिज संपत्ति से समृद्ध है। स्वतंत्रता के बाद विविध खनिज अन्वेषण संस्थाओं द्वारा सर्वेक्षण के परिणाम स्वरुप देश के विभिन्न भागों में खनिजों का पता चला है। औद्योगीकरण के परिणाम स्वरुप भी देश में खनिज उत्पादन का चित्र बदला है।

खनिज संपत्ति का संरक्षण :

खनिज, उपयोग होने पर, नाशवान संपत्ति है। उद्योग तथा कृषि के विकास में बढ़ती हुई माँग, सर्वेक्षण की आधुनिक पद्धति तथा खान खोदने की तकनीक में प्रगति के कारण खनिजों के उत्पादन में वृद्धि हुई है। उद्योग-धंधे में शोध के कारण भी खनन व्यवसाय को गति मिली है। कुछ प्रदेशों में खनिज समाप्त होने के कगार पर हैं।

खनिज-संपत्ति का संरक्षण खनन कार्य के तंत्रज्ञान तथा खनिजों को सावधानी से उपयोग में लाने की कुशलता को बढ़ाकर किया जा सकता है। अत्यावश्यक उपयोग, दूसरे उपयुक्त साधनों की खोज तथा उपयोग ऐसी पद्धति का विकास जिसमें कम मात्रा वाले खनिजों से भी शुद्ध धातु तथा अधातु प्राप्त हो सकें, खनिजों के संरक्षण के लिए बड़े, महत्वपूर्ण सिद्ध होने जा रहे हैं। कुछ खनिजों का और धातुओं का पुनः उपयोग किया जा सकता है। उदा. लोहे के भंगार पुनः काम में आ सकते हैं। इस प्रकार नए तंत्रज्ञान को खनिज संरक्षण की प्रक्रिया में महत्वपूर्ण स्थान है।

देश का सतत औद्योगिक विकास इस बात पर अवलंबित है कि हम अपने खनिजों का उपयोग कितना सजग तथा सचेत होकर करते हैं।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :
   - क. भारत में .... प्रकार के लोहे का भंडार विपुल मात्रा में है।
   - ख. तमिलनाडु राज्य के .... जिले में ताँबे की खाने हैं।
   - ग. राजस्थान का खेतड़ी क्षेत्र .... उत्पादन के लिए महत्वपूर्ण है।
   - घ. जिप्सम के उत्पादन में .... राज्य अग्रणी है।

२. उचित जोड़ियाँ लगाओ :

'क' समूह	'ख' समूह
ट. हीरा	१. हजारीबाग
ठ. अभ्रक	२. शिमोगा
ड. लोहा	३. राँची
ढ. बाक्साइट	४. मोसाबनी
ण. ताँबा	५. पन्ना
	६. मंडी

३. कारण लिखो :
   - त. भारत बड़े पैमाने पर लौह खनिज का निर्यात करता है।
   - थ. कुछ वर्षों से भारत में अभ्रक की माँग कम होती जा रही है।
   - द. देश का औद्योगिक विकास यथोचित खनिज संपत्ति के उपयोग पर निर्भर है।

४. टिप्पणियाँ लिखो :
   - प. लौह खनिज का प्रमुख उत्पादक राज्य.
   - फ. मैंगनीज उत्पादक क्षेत्र.
   - ब. खनिज संपत्ति का संरक्षण

५. निम्नांकित प्रश्नों के उत्तर लिखो :
   - य. भारत के प्रमुख धातु खनिज संबंधी जानकारी लिखो।
   - र. भारत की खनिज संपत्ति का महत्व स्पष्ट करो।
   - ल. भारत में अधातु खनिज के वितरण की जानकारी लिखो।

६. भारत के मानचित्र में निम्नांकित को दर्शाकर यथावश्यक नाम लिखो
   - १. उड़ीसा के लौह खनिज क्षेत्र,
   - २. चैबासा (सिंहभूमि)।

(आ)

एक बार किसी खनिज क्षेत्र में जाकर वहाँ के उत्पादन की संक्षिप्त जानकारी प्राप्त करो।

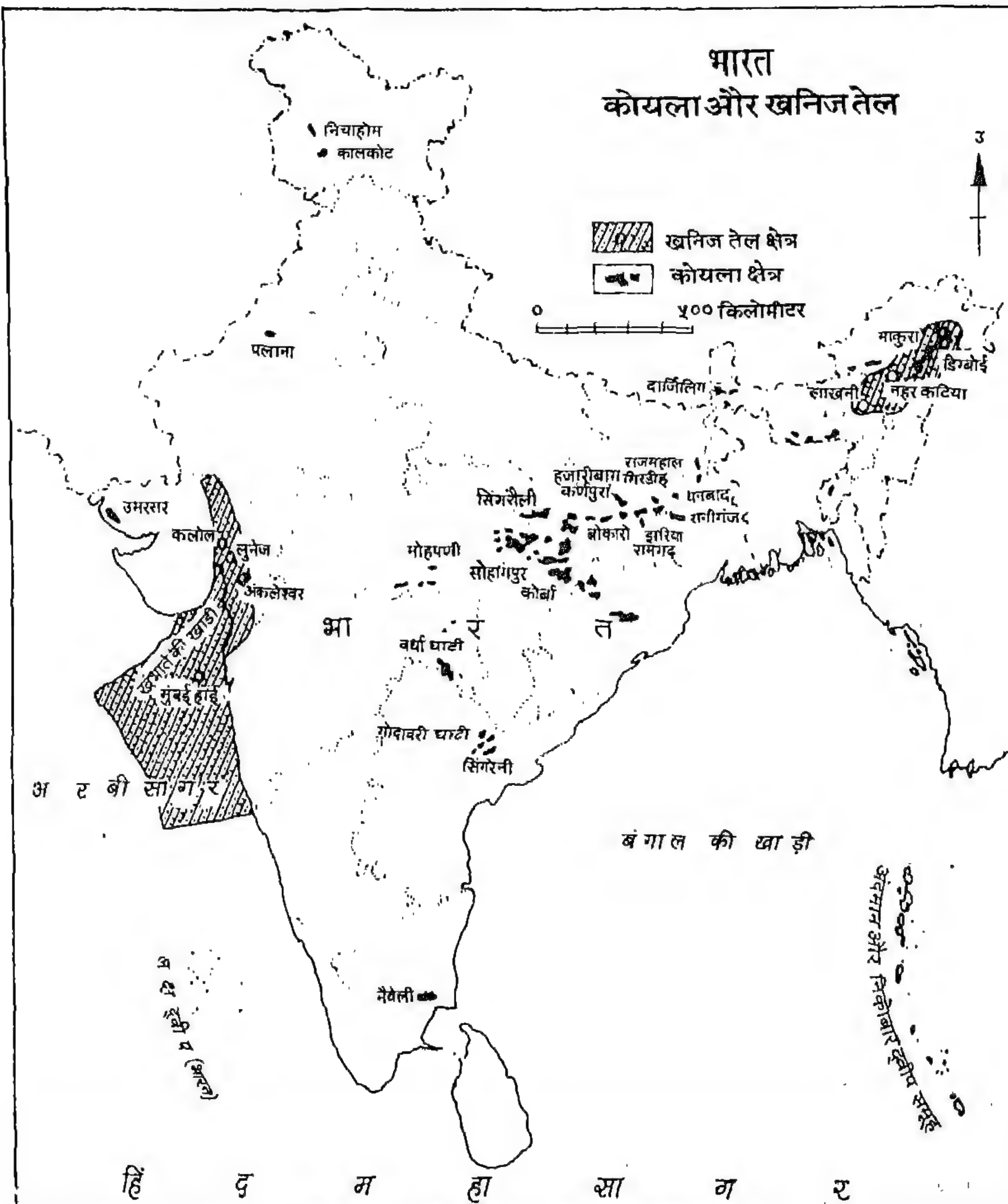
⁕ ⁕ ⁕

प्रकरण १३

ऊर्जा के साधन

मनुष्य को अपनी आवश्यकता की पूर्ति करने के लिए मेहनत करनी पड़ती है। मेहनत करने में जिस शक्ति का व्यय होता है, उसे ऊर्जा कहते हैं। विश्व में औद्योगिक क्रांति के पूर्व पशु तथा मानव ही प्रमुख ऊर्जा के साधन थे। इनसे प्राप्त होने वाली ऊर्जा को प्राणिज ऊर्जा कहा जाता है।

प्रारंभ में कोयले का उपयोग ऊर्जा के साधन के रूप में किया गया। कोयले का ईंधन के रूप में प्रयोग करके पहले वाष्प इंजन चलाया गया। इसके उपरांत खनिज तेल का उपयोग मशीनों, मोटरों, जलयानों तथा वायुयानों में ईंधन के रूप में होने लगा। इन ऊर्जा-साधनों के प्रयोग से विविध वस्तुओं का उत्पादन बड़े



आकृति १३.१ : भारत : कोयला तथा खनिज तेल क्षेत्र

पैमाने पर होने लगा। कोयला तथा खनिज तेल अप्राणिज ऊर्जा-साधन हैं।

कोई देश विकसित है या नहीं, यह निश्चित करने के लिए प्रति व्यक्ति ऊर्जा के उपयोग को आधार माना जाता है। अतः इससे स्पष्ट होता है कि किसी देश की औद्योगिक तथा आर्थिक प्रगति के लिए ऊर्जा के साधन प्रमुख प्रेरक तत्व हैं। इस प्रकरण में हम भारत के ऊर्जा साधनों का अध्ययन करने जा रहे हैं।

ऊर्जा साधनों का वर्गीकरण :

प्राणिज तथा अप्रमाणिज ऊर्जा साधन का वर्गीकरण निम्नांकित रूप से किया जाता है –

पारंपारिक अव्यवसायिक ऊर्जा के साधन :

भारत में उपयोग होने वाली संपूर्ण ऊर्जा का लगभग ५०% ऊर्जा पशुओं के गोबर, जलाऊ लकड़ी तथा खेती से प्राप्त फसलों के डंठल आदि से प्राप्त की जाती है। देश के विभिन्न भागों में इनकी उपलब्धता के अनुसार ही इनका उपयोग होता है। सामान्यतः ग्रामीण क्षेत्रों में इनका उपयोग अधिक होता है। यद्यपि इस ऊर्जा का ठीक-ठीक मापन असंभव है तथापि यह निश्चित है कि ग्रामीण क्षेत्र के अधिकांश लोग इन साधनों का उपयोग करते हैं।

पारंपरिक व्यावसायिक ऊर्जा के साधन :

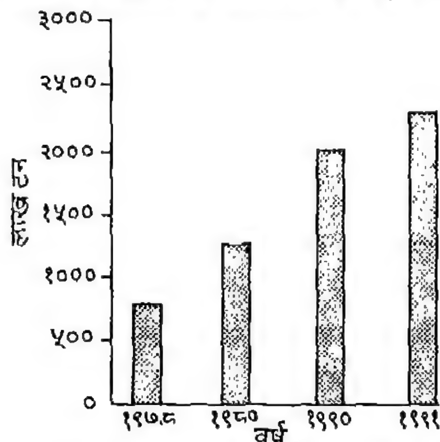
भारत में पत्थर का कोयला, खनिज तेल तथा प्राकृतिक गैस अप्राणिज तथा व्यवसायिक ऊर्जा साधन हैं।

पत्थर का कोयला :

भारत में पत्थर का कोयला अत्यंत महत्वपूर्ण ऊर्जा का साधन है, क्योंकि देश में खनिज तेल का बहुत सीमित भंडार है। देश की ६०% व्यावसायिक ऊर्जा कोयले से प्राप्त होती है। कोयले का उपयोग लौह-इस्पात, रसायन, रंग उद्योग तथा अन्य अनेक वस्तुओं के उत्पादन में होता है।

देश में पत्थर के कोयले का संभाव्य भंडार लगभग २००० करोड़ टन आँका जाता है।

विश्व के कोयला उत्पादन में भारत चौथे स्थान पर है। देश के झारखंड राज्य में सबसे अधिक उत्पादन होता है। रामगढ़, गिरडीह, कर्णपुरा, बोकारो आदि झारखंड में प्रमुख पत्थर के कोयला उत्पादक क्षेत्र हैं। पश्चिमी बंगाल राज्य में रानीगंज तथा झरिया क्षेत्र में उत्तमकोटि के कोयले के भंडार हैं। मध्य प्रदेश में मोहपणी, सिंगरौली और छत्तीसगढ़ राज्य में कोरबा तथा सोहागपुर आदि क्षेत्रों में कोयले का उत्पादन होता है। महाराष्ट्र में वर्धा नदी की घाटी पेंच-कन्हान क्षेत्र, नागपुर तथा चंद्रपुर जिले में कोयले का उत्पादन होता है। इनके अतिरिक्त तमिलनाडु में नेवेली, आंध्र प्रदेश में सिंगरेनी, गुजरात में उमरसर के पास भी कोयला पाया जाता है।



आकृति १३.२ : भारत में कोयले का उत्पादन

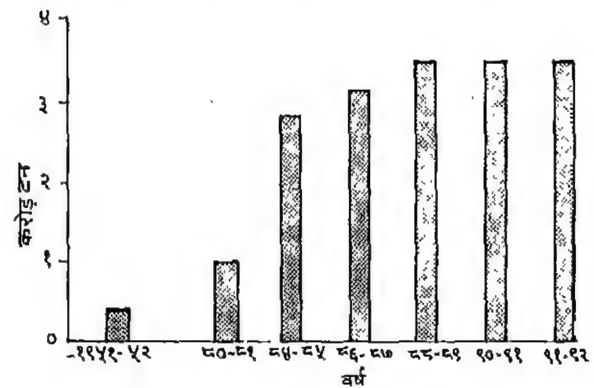
गत दो शताब्दियों से कोयला उत्पादन में उल्लेखनीय वृद्धि हुई है। यह आकृति से स्पष्ट होता है।

खनिज तेल :

खनिज तेल से पेट्रोल, डीजेल, मिट्टी का तेल, बेंजीन, वैसलीन, मोम, औषधि-द्रव्य आदि पदार्थ पाए जाते हैं। स्वतंत्रता के पूर्व काल में खनिज तेल का उत्पादन मुख्यतः असम राज्य में होता था। इसके बाद गुजरात राज्य के विस्तृत क्षेत्र में खनिज तेल पाया गया। भारत का सबसे बड़ा खनिज तेल भंडार मुंबई के समीप समुद्र में पाया गया है।

राजस्थान, कृष्णा, गोदावरी तथा कावेरी घाटी, पश्चिम बंगाल का दक्षिण भाग तथा अंदमान द्वीप आदि स्थानों में भी खनिज तेल पाया गया है, किंतु अभी यहाँ व्यावसायिक उत्पादन प्रारंभ नहीं हुआ है।

असम राज्य में डिगबोई, नहरकटिया, रुद्रसागर तथा नूनमाटी एवं गुजरात राज्य में अंकलेश्वर, कोयाली, कलोल तथा नवगाँव

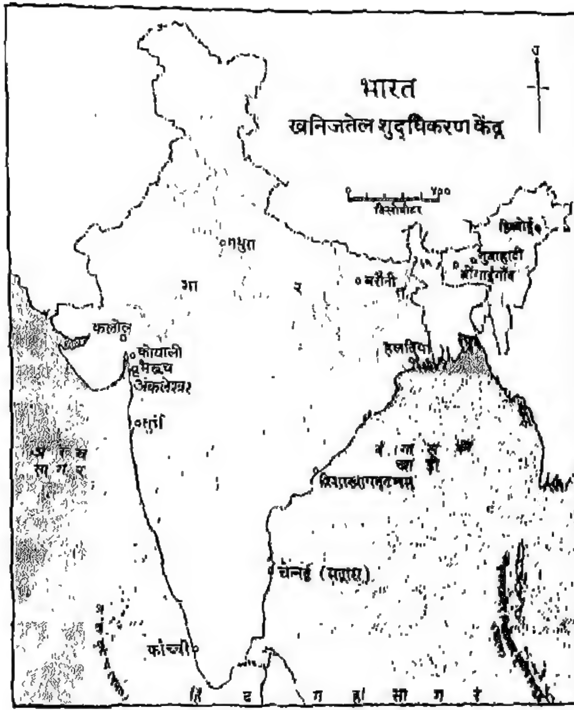


आकृति १३.३ : खनिज तेल उत्पादन

प्रमुख खनिज तेल उत्पादक केंद्र हैं। भारत में खनिज तेल का उपयोग कुल उत्पादन की अपेक्षा अधिक किया जाता है। जिससे उपयोग में लाए कुल खनिज तेल में से ७०% खनिज तेल आयात करना पड़ता है। स्वतंत्रता के बाद नए तेल-क्षेत्रों की खोज तथा उत्पादन बढ़ाने के लिए अधिक प्रयत्न किए गए। इसके परिणामस्वरूप जो वृद्धि हुई वह आकृति में स्पष्ट दिखाई देती है।

देश में तेल शुद्धिकरण के १२ कारखाने हैं। इनमें से ७ कारखाने समुद्री तटों पर हैं। खनिज तेल किनारों पर शुद्ध करने से यातायात का खर्च कम होता है तथा अति ज्वलनशील होने के कारण इसे आंतरिक भागों तक ले जाने में खतरा रहता है।

प्राकृतिक गैस : प्राकृतिक गैस का उपयोग ऊर्जा के एक महत्वपूर्ण साधन के रूप में बड़े पैमाने पर किया जाता है। सामान्यतः यह खनिज तेल उत्पादक क्षेत्रों में प्राकृतिक गैस के रुप में पाई जाती है। भारत में प्राकृतिक गैस का अनुमानित भंडार



आकृति १३.४ : भारत में तेल शुद्धिकरण केंद्र

लगभग ७०००करोड़ घन-मीटर है,इनमें से सबसे बड़ा भंडार मुंबई के समीप 'मुंबई हाई' क्षेत्र में है। दूसरा महत्वपूर्ण क्षेत्र गुजरात में अंकलेश्वर तथा खंभात की खाड़ी में तेल क्षेत्रों के समीप है। आसाम तथा पंजाब में भी प्राकृतिक गैस के भंडार हैं।

प्रतिवर्ष लगभग ८०० करोड़ घनमीटर प्राकृतिक गैस का उपयोग होता है। रासायनिक खाद के कारखानों तथा घरेलू ईंधन के लिए यह एक महत्वपूर्ण साधन बना है। अगर हम इसे ग्रामीण भागों तक पहुँचाने में सफल होंगे तो ईंधन के रुप में प्रयुक्त होने वाली लकड़ी पर का भार कम होगा। साथ ही वनों का संरक्षण होकर पर्यावरण संतुलन स्थापित करने में सहायता होगी।

विद्युत निर्माण :

विद्युत स्वत: ऊर्जा का साधन नहीं है। कोयला, खनिज तेल, पानी, अणु, खनिज तथा आजकल ज्वार-भाटा का उपयोग विद्युत-निर्माण के लिए किया जाता है।

विद्युत उत्पादन के लिए टरबाइन किसकी सहायता से घुमाना है, के आधार पर विद्युत के प्रकार तथा यंत्र सामग्री का निर्धारण होता है। टरबाइन के घूमते ही जनरेटर द्‌वारा बिजली उत्पन्न होने लगती है। कोयला, खनिज तेल, प्राकृतिक गैस के जलने पर पैदा हुई उष्मा से टरबाइन घुमाया जाता है। इस प्रकार पैदा हुई बिजली को 'औष्णिक विद्युत' (ताप बिजली) कहा जाता है। जब ऊँचाई से गिरते हुए पानी की शक्ति से टरबाइन घुमाया जाता है, तो इस प्रकार तैयार हुई बिजली को 'जलविद्युत' कहा जाता है।

विद्युत के कुछ महत्वपूर्ण लाभ हैं। इसको लंबी दूरी से तार द्‌वारा प्रवाहित करके ला सकते हैं। इस प्रकार दूरस्थ उद्‌योग-धंधों तथा लोकबस्तियों को विद्युत-आपूर्ति की जा सकती है। आवश्यकतानुसार इसके उत्पादन को घटाया-बढ़ाया जा सकता है। आज बिजली के बिना औद्‌योगिक विकास की कल्पना नहीं की जा सकती।

भारत के अति वृष्टियाले पर्वतीय प्रदेश, केरल, हिमाचल प्रदेश, मेघालय, मणिपुर, नागालैंड, त्रिपुरा तथा सिक्किम राज्य की संपूर्ण शक्ति, जल विद्युत हैं। इसी प्रकार जम्मू-कश्मीर, उड़ीसा तथा कर्नाटक राज्यों में ७०% से अधिक जलविद्युत का उपयोग होता है। अन्य राज्यों में जलविद्युत की अपेक्षा ताप-विद्युत का उपयोग अधिक होता है।

अणु ऊर्जा :

अणु के विभाजन करने से ऊर्जा प्राप्त होती है। यूरेनियम तथा थोरियम खनिजों के विभाजन से यह ऊर्जा प्राप्त होती है।

इस समय महाराष्ट्र में मुंबई के समीप तारापुर, राजस्थान में रावतभाटा, तमिलनाडु में कलपक्कम, उत्तर प्रदेश में नरोरा तथा गुजरात राज्य में काकरापारा में अणु ऊर्जा केंद्र कार्यरत हैं।

भारत के ताप, जल तथा अणु ऊर्जा केंद्र मानचित्र में दर्शाए गए हैं।

देश के विद्युत उत्पादन में बहुत वृद्धि हुई है। इसके कारण उद्योग क्षेत्र, यातायात, सिंचाई, नागरी तथा ग्रामीण क्षेत्रों का समुचित विकास हुआ है।

प्रादेशिक तथा राष्ट्रीय विद्युत जाल-योजना :

विद्युत का भंडारण नहीं किया जा सकता तथा दूर तक ले जाने में इसका क्षय होता है। इन तथ्यों पर विचार करते हुए प्रादेशिक तथा राष्ट्रीय विद्युत जाल की योजना बनाई गई। इससे विद्युत उत्पादक क्षेत्रों से बिजली उन क्षेत्रों तक पहुँचाई जा सकती है, जहाँ उसकी आवश्यकता है तथा किसी विद्युत उत्पादक केंद्र के बंद हो जाने पर विद्युत की पूर्ति पूरे क्षेत्र में यथावत रखी जा सकती है।

संपूर्ण भारत को निम्न पाँच विद्युत विभागों में बाँटा गया है।

१. पश्चिम विभाग :

इसके अंतर्गत गुजरात, महाराष्ट्र, मध्य प्रदेश, छत्तीसगढ़ एवं गोआ राज्य तथा दीव-दमन, दादरा-नगर हवेली केंद्रशासित प्रदेश सम्मिलित हैं।

२. दक्षिण विभाग :

इस विभाग के अंतर्गत आंध्र प्रदेश, तमिलनाडु, कर्नाटक तथा केरल राज्य एवं पांडिच्चेरि, लक्षद्‌वीप ये केंद्रशासित प्रदेश सम्मिलित हैं।

३. पूर्व विभाग :

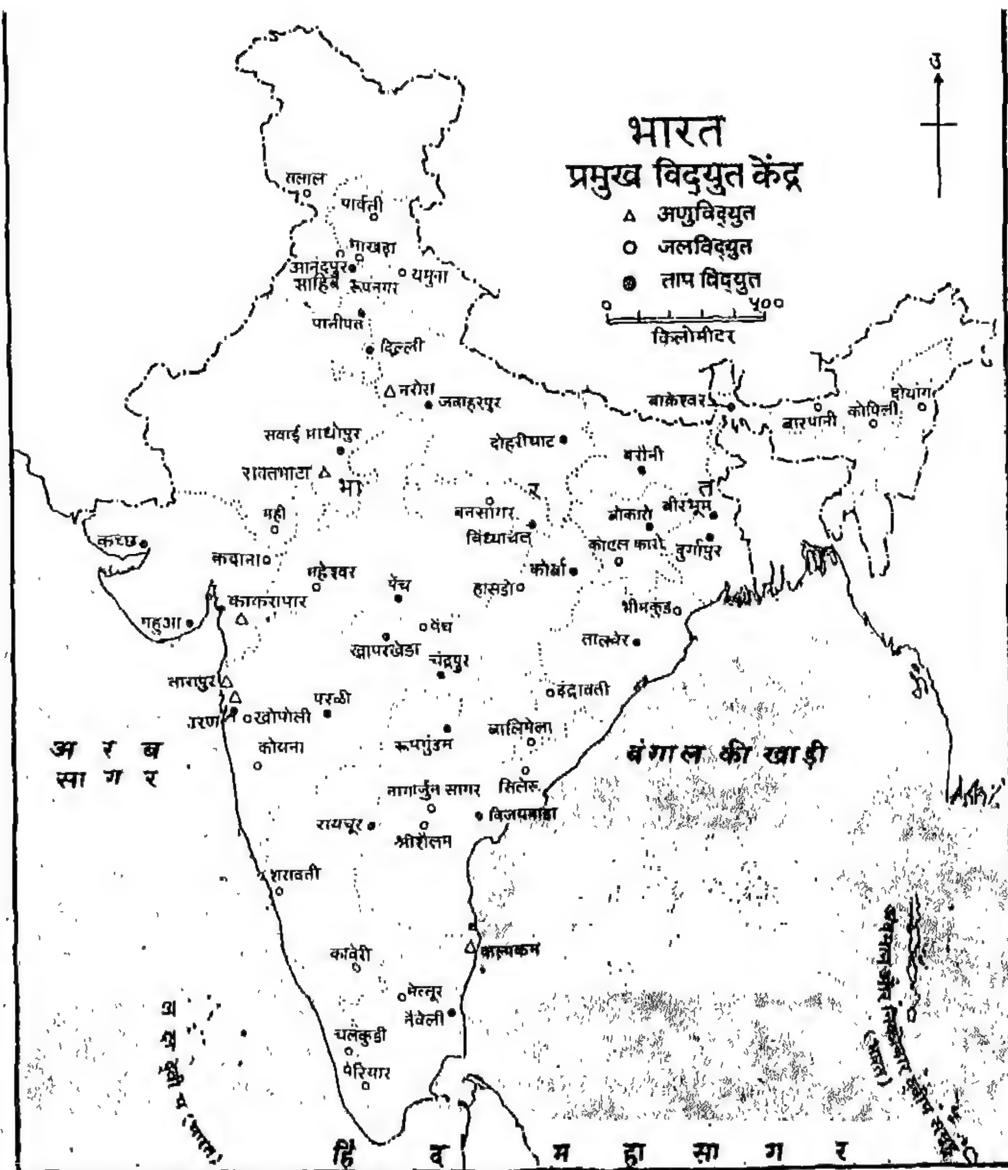
पश्चिम बंगाल, उड़ीसा, बिहार, झारखंड तथा सिक्किम राज्य इस विभाग के अंतर्गत आते हैं।

४. उत्तर-पूर्व विभाग :

असम, मेघालय, मिजोरम, अरुणाचल प्रदेश, मणिपुर, त्रिपुरा तथा नागालैंड राज्यों का इस विभाग में समावेश होता है।

५. उत्तर विभाग :

इस विभाग में जम्मू-कश्मीर, हिमाचल प्रदेश, पंजाब, राजस्थान, हरियाणा, उत्तर प्रदेश तथा उत्तरांचल इन राज्यों का समावेश है।



आकृति १३.५ : भारत : प्रमुख विद्युत केंद्र

उपर्युक्त विभागों के केंद्रों को एक दूसरे से जोड़ने के बाद सभी विभाग आपस में जुड़ जाएँ तो विद्युत-आपूर्ति अखंडित एवं अनवरत रह सकती है । परिणामस्वरूप इसका समुचित वितरण होगा तथा इसका क्षय कम होगा ।

अपारंपरिक ऊर्जा के साधन :

हम कोयला, खनिज तेल और अणु खनिज पर ऊर्जा प्राप्ति हेतु हमेशा के लिए निर्भर नहीं रह सकते । ये साधन कभी भी समाप्त हो सकते हैं । विश्व के वैज्ञानिक नए ऊर्जा स्रोतों की खोज में लगे हुए हैं । इस समय सूर्यप्रकाश, वायु, ज्वार की लहरें, भू-ताप ऊर्जा तथा कूड़े-कचरे से ऊर्जा उत्पादित की जा रही है । इन सबको अपारंपरिक ऊर्जा के साधन कहा जाता है ।

भारत उष्ण कटिबंधीय देश है । यहाँ लगभग वर्षभर स्वच्छ सूर्यप्रकाश रहता है । इस सौर-शक्ति से विद्युत उत्पादन करने के लिए कुछ मशीनों तथा काँच की निर्मिति की गई है; किंतु अभी इस ऊर्जा का उत्पादन अल्प मात्रा में किया जा रहा है ।

पवन ऊर्जा का उत्पादन गुजरात, महाराष्ट्र, उड़ीसा, तमिळनाडु राज्यों में कहीं-कहीं किया जाता है । साथ ही देश में ज्वार से ऊर्जा का निर्माण प्रायोगिक स्तर पर किया जाता है ।

हिमाचल प्रदेश के मणिकरण स्थान पर ५ किलोवाट शक्ति का भूताप ऊर्जा से चलित विद्युत केंद्र प्रारंभ किया गया है ।

नगरों में प्रतिदिन बड़ी मात्रा में कूड़ा-कचरा एकत्र होता है । इस कूड़े-कचरे से ऊर्जा प्राप्त करने के लिए तंत्रज्ञान विकसित किया गया है । इस प्रकार का एक ऊर्जा केंद्र दिल्ली के पास तिमारपुर में स्थापित किया गया है ।

अपारंपरिक ऊर्जा के विकास में लगने वाली बड़ी पूँजी, इसकी सबसे बड़ी कठिनाई है । कम खर्च वाले तंत्रज्ञान के विकसित होने पर ये अपारंपरिक ऊर्जा साधन मानव के लिए बड़े उपयोगी सिद्ध होंगे । नाशवान ऊर्जा साधनों पर पड़नेवाला भार कम करने, उनको अधिक समय तक चालू रखने तथा पारंपरिक ऊर्जा साधनों को संरक्षित रखने के लिए ये अपारंपरिक ऊर्जा के साधन प्रमुख उपाय हैं ।

स्वाध्याय

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१. अ. रिक्त स्थानों में उचित शब्द लिखो :
   क. झरिया क्षेत्र .... उत्पादन के लिए प्रसिद्ध है ।
   ख. बोकारो की कोयला-उत्पादन की खानें .... राज्य में हैं।
   ग. गुजरात राज्य में लुनेज तथा अंकलेश्वर .... उत्पादक केंद्र हैं ।
   घ. प्राकृतिक गैस का सर्वाधिक भंडार .... राज्य के पश्चिम क्षेत्र में हैं ।
   ङ. उत्तर प्रदेश के .... में अणु विद्युत केंद्र कार्यरत है ।

२. उचित जोड़ियाँ लगाओ :

'क' समूह	'ख' समूह
च. रानीगंज	१. गुजरात
छ. अंकलेश्वर	२. असम
ज. डिगबोई	३. महाराष्ट्र
झ. तारापुर	४. हिमाचल प्रदेश
ञ. मणिकरण	५. प. बंगाल
	६. राजस्थान

३. कारण लिखो :
   ट. भारत के ग्रामीण भागों में पारंपरिक अव्यवसायिक ऊर्जा का बड़े पैमाने पर उपयोग किया जाता है ।
   ठ. तेल शुद्धिकरण कारखाने समुद्री किनारे पर स्थित हैं ।
   ड. प्राकृतिक गैस घरेलू ईंधन के लिए महत्वपूर्ण ऊर्जा साधन है ।
   ढ. अपारंपरिक ऊर्जा के साधनों का महत्व बढ़ रहा है ।

४. टिप्पणियाँ लिखो :
   त. प्रादेशिक तथा राष्ट्रीय विद्युत जाल की योजना ।
   थ. भारत के कोयला उत्पादक क्षेत्र ।
   द. भारत के विद्युत विभाग ।

५. भारत के मानचित्र में निम्नलिखित को दर्शाओ तथा यथास्थान उनके नाम भी लिखो :
   १. रानीगंज कोयला क्षेत्र, २. डिगबोई खनिज तेल क्षेत्र,
   ३. मुंबई हाई, ४. नेवेली,
   ५. काकरापारा, ६. तारापुर अणु विद्युत केंद्र

(आ)

पत्थर की कोयला-खान, खनिज तेल के कुएँ, ताप विद्युत केंद्र, सौर ऊर्जाकेंद्र जल विद्युत केंद्र आदि में से जहाँ संभव हो वहाँ जाकर उसकी जानकारी प्राप्त करे ।

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प्रकरण १४

उद्‍योग-धंधे

किसी देश की अर्थव्यवस्था, उस देश के औद्‍योगिक विकास के धरातल पर अवलंबित है । संयुक्त राज्य अमेरिका, ग्रेट ब्रिटेन (युनायटेड किंगडम), जापान, जर्मनी तथा इसी प्रकार के विश्व के सभी प्रगत राष्ट्र उद्‍योग-धंधों में विकसित हैं । कच्चे माल को अधिक उपयुक्त तैयार माल के रुप में रुपांतरित करने की प्रक्रिया को 'उद्‍योग' कहा जाता है ।

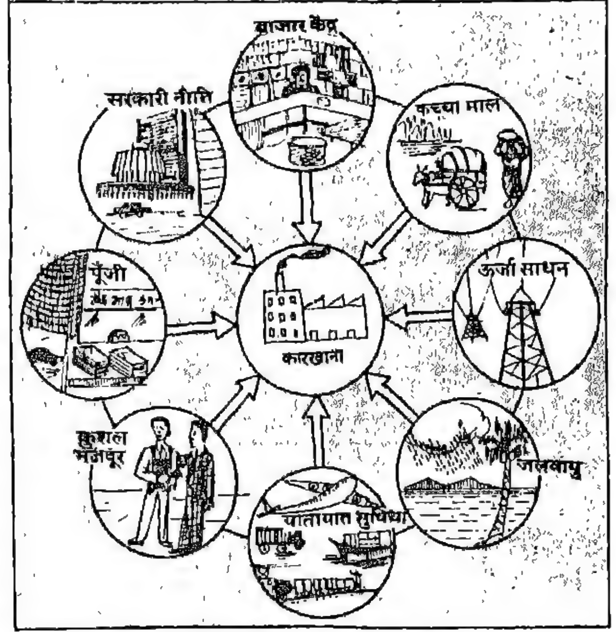
कारखानों में साधन संपत्ति को अधिक उपयोगी वस्तु के रुप में रुपांतरित किया जाता है । औद्‍योगिक दृष्टि से पिछड़े देश बड़े पैमाने पर अपना कच्चा माल, कम मूल्य पर निर्यात करते हैं। इसके विपरीत उन्हीं देशों से तैयार माल अधिक मूल्य पर आयात करते हैं । अधिक जनसंख्या होने के कारण तैयार माल के लिए भारत स्वयं एक बड़ा बाजार है । इसके लिए औद्‍योगिक विकास की गति बढ़ाने तथा उसमें विविधता निर्माण करने की आवश्यकता है । स्वतंत्रता प्राप्ति के बाद भारत ने विस्तृत औद्‍योगिक विकास की नीति अपनाकर उस पर चलना प्रारंभ किया । उद्‍योग-धंधों के विकास के लिए विविध आधारभूत सुविधाएँ उपलब्ध कराई जा रही हैं ।

औद्‍योगिक क्रांति के पूर्व देश में उत्तमकोटि के कपड़े, विविध प्रकार की कलाकृतियाँ तथा अन्य सामग्री मानव श्रम द्‍वारा तैयार की जाती थीं । इसमें अधिक समय तथा लागत लगती थी । औद्‍योगिक क्रांति के परिणामस्वरुप अप्राणिज ऊर्जा से चलने वाली मशीनों का उपयोग बढ़ा । इस प्रकार कम लागत और बड़े पैमाने पर उत्पादन प्रारंभ हुआ । उत्पादन की इस स्पर्धा में घर-घर में चलने वाले छोटे उद्‍योग नहीं टिक सके ।

उद्‍योग-धंधों के स्थानीयकरण के तत्व :

जिस स्थान पर कारखाने की स्थापना की जाती है उस स्थान को **उद्‍योग-धंधे का स्थान** कहा जाता है । उद्‍योग-धंधे के स्थान को निश्चित करने में अनेक तत्वों का समावेश होता है । उनको **स्थानीयकरण के तत्व** कहा जाता हैं । इसमें कच्चा माल, ऊर्जा, यातायात की सुविधा, बाजार, कुशल कारीगर, पूँजी, सरकारी नीति, जलवायु, जल आदि का समावेश होता है । इन सभी तत्वों का लागत की दृष्टि से तुलनात्मक अध्ययन करने के बाद जहाँ कुल उत्पादन लागत सबसे कम आता है, वहाँ कारखाने की स्थापना की जाती है ।

साधारणत: स्थानीयकरण के आधार पर उद्‍योगों के दो प्रकार किए जाते हैं । कच्चे माल के समीपस्थ तथा बाजार के समीपस्थ ।



आकृति १४.१ : उद्‍योग-धंधे के स्थानीयकरण के तत्व

कच्चे माल के समीपस्थ उद्‍योग :

कुछ कच्चे मालों का भार बहुत होता है; किंतु उनसे तैयार माल का भार कम हो जाता है । इस प्रकार कच्चे माल को ढोने का खर्च अधिक होता है । इसलिए कच्चा माल उपलब्ध होने वाले क्षेत्रों में ही कारखानों की स्थापना की जाती है । लौह-इस्पात के कारखाने तथा लकड़ी कटाई के कारखाने इस प्रकार के उत्तम उदाहरण हैं ।

नाशवान कच्चे माल से पक्का माल बनाने वाले कारखाने कच्चा माल उत्पादक प्रदेशों में स्थापित किए जाते हैं । कच्चे माल के खराब होने का भय तथा तुलना की दृष्टि से पक्के माल के वितरण में ढुलाई का कम खर्च होना, इसका मूल कारण है । गन्ने से शक्कर उत्पादन तथा दूध से दुग्धजन्य पदार्थ इसके उदाहरण हैं।

बाजार समीपस्थ उद्‍योग :

जिन उद्‍योगों में कच्चे माल से उत्पादित तैयार माल का भार और आकार बढ़ जाता है उन उद्‍योगों को बाजार के समीप स्थापित किया जाता है । मोटर बनाने का कारखाना इसका उत्तम उदाहरण है ।

यदि तैयार माल नाजुक, टूटने-फूटने वाले तथा जिनके रख-रखाव में कठिनाई हो, तो ऐसे उद्‍योग बाजार के समीप स्थापित किए जाते हैं । अत: काँच के सामान तथा वैज्ञानिक उपकरण बनाने के कारखाने बाजार के समीप पाए जाते हैं ।

उपभोक्ता की पसंद तथा माँग का तत्काल आकलन करने की दृष्टि से तैयार कपड़ों के कारखाने, बाजार के समीप स्थित होते हैं ।

कच्चा माल तथा बाजार, इन दो प्रमुख तत्वों के अतिरिक्त कभी-कभी अन्य तत्वों का अधिक महत्व होता है तथा ये उद्योगों के स्थानीयकरण के प्रमुख तत्व सिद्ध होते हैं। हाथकरघा वस्त्र-उद्योग में सस्ते श्रम की आवश्यकता होती है। अतः मालेगाँव, इचलकरंजी, नागपुर, सोलापुर, भिवंडी आदि शहरों में यह उद्योग केंद्रित है।

कभी-कभी उद्योगों के स्थानीयकरण में सरकारी नीति महत्वपूर्ण भूमिका निभाती है। बड़े शहरों में उद्योगों के बढ़ते हुए केंद्रीकरण को रोकने के लिए महाराष्ट्र सरकार ने विकेंद्रीकरण नीति को अपना कर राज्य के अनेक भागों में औद्योगिक बस्तियाँ बसाकर कारखानें चलाने के लिए प्रेरणा दी है।

भारत के प्रमुख उद्योग :

भारत में विविध प्रकार की विपुल मात्रा में साधन संपत्ति पाई जाती है। अतः देश में उद्योगों के विकास की बहुत संभावना है। कच्चे माल के साथ ही भारत में ऊर्जा उत्पादन, सड़कों तथा लोहमार्गों में वृद्धि, तक्नीकी शिक्षा से प्राप्त अनुभवी कारीगर तथा तंत्रज्ञ, बाजार, अनुकूल शासकीय नीति आदि आधारभूत सुविधाओं की उल्लेखनीय वृद्धि हुई है; परंतु इन सुविधाओं का सर्वत्र समान वितरण न होने के कारण उद्योगों का वितरण असमान है।

कच्चे माल के प्रकारानुसार उद्योगों का वन संपत्ति, प्राणी संपत्ति, खनिज संपत्ति, कृषि आधारित उद्योग आदि के रूप में वर्गीकरण किया गया है।

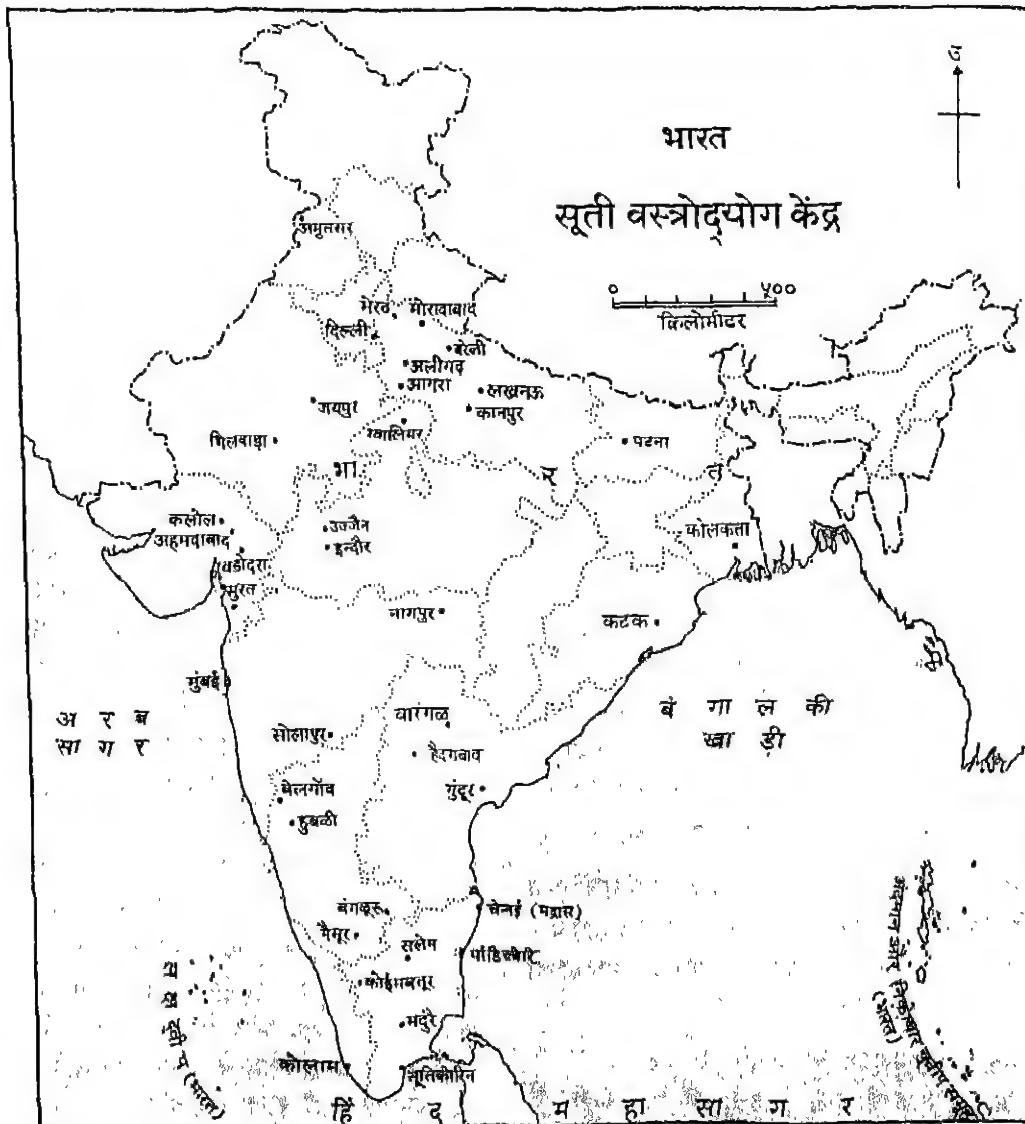
कृषि आधारित उद्योग :

देश में कपास, गन्ना, जूट, तिलहन, तंबाकू, चाय, काफी, रबर आदि का उद्योगों में कच्चे माल के रूप में उपयोग किया जाता है। सूती वस्त्रोद्योग, शक्कर, जूट, तेल की मिलें, वनस्पति तेल के कारखाने आदि कृषि आधारित उद्योग हैं। इनमें से सूती वस्त्रोद्योग तथा शक्कर उद्योग का हम अध्ययन करेंगे।

सूती वस्त्रोद्योग :

कपास, जूट, ऊन, रेशम आदि के रेशों से वस्त्र बनाया जाता है। आजकल रेयान, नायलोन, टेरीन आदि कृत्रिम रेशों से भी कपड़ा तैयार किया जाता है।

कपास से बीज निकालना, धुनाई, सूतकताई, कपड़ा बुनाई, रँगाई आदि सभी प्रक्रियाओं का समावेश सूती वस्त्रोद्योग के अंतर्गत होता है। कपास, हलका भार, न घटने वाला कच्चा माल है। अतः इस उद्योग की स्थापना कच्चे माल की क्षेत्रीय सुलभता



आकृति १४.२ : प्रमुख सूती वस्त्रोद्योग केंद्र

पर न करके, बाजार, नम जलवायु, कार्यकुशल श्रमिक, यातायात के साधनों की सुविधा आदि तत्वों के आधार पर की जाती है।

भारत के सूती वस्त्रोद्‌योग की वैभवशाली परंपरा है। प्राचीन काल से ही भारत महीन कपड़े बनाकर उनका यूरोपीय देशों को निर्यात करता रहा है। आज बड़े सूती वस्त्रोद्‌योग के अतिरिक्त देश के अनेक भागों में हथकरघे पर कपड़ा बनाने का व्यवसाय कम या अधिक पैमाने पर चलता है। इस प्रकार सूती वस्त्रोद्‌योग से बहुत बड़ी संख्या में लोगों को रोजगार मिला है।

भारत में महाराष्ट्र, गुजरात तथा तमिलनाडु में यह उद्‌योग मुख्यरूप से विकसित हुआ है। इनके अतिरिक्त पश्चिम बंगाल, उत्तर प्रदेश, पंजाब, हरियाणा, कर्नाटक, केरल आदि राज्यों में सूती वस्त्रोद्‌योग विकसित हुआ है। मानचित्र में कुछ प्रमुख केंद्र दर्शाए गए हैं।

मुंबई तथा अहमदाबाद सूती वस्त्रोद्‌योग के प्रमुख केंद्र हैं। देश में सूती वस्त्रोद्‌योग के विकेंद्रीकरण से अन्य केंद्रों का निर्माण हुआ है। हाथकरघा तथा यंत्र पर कपड़ा बुनने के उद्‌योग विविध भागों में पाए जाते हैं। कपड़ा उद्‌योग के कुल उत्पादन का ३०% कपड़ा हाथकरघा तथा यंत्र करघा से प्राप्त होता है।

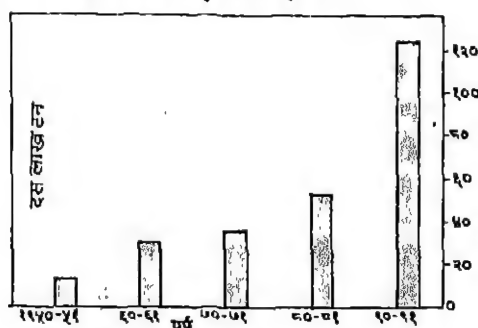
भारत में वस्त्र उत्पादन में वृद्‌धि हुई है। साथ ही इसकी गुणवत्ता भी बढ़ी है। भारतीय तैयार कपड़ों की विदेशों में माँग बढ़ने के कारण, तैयार कपड़ों का उद्‌योग बड़ी तेजी से विकसित हो रहा है।

शक्कर उद्‌योग :

शक्कर उद्‌योग का विकास मुख्यत: गन्ने की उपलब्धता पर आधारित है। पहले शक्कर कारखानों में लगने वाली मशीनों का विदेशों से आयात करना पड़ता था, जिसमें अधिक पूँजी की आवश्यकता पड़ती थी। अत: भारत में शक्कर की अपेक्षा गुड़ अधिक पैदा किया जाता था। अब देश में ही मशीनें बनाई जाती हैं। अत: अनेक भागों में सहकारी आधार पर इसके कारखाने स्थापित किए गए हैं। परिणामस्वरूप देश में शक्कर के कारखानों का तेजी से विकास हो रहा है।

गन्ना, भार घटने वाला कच्चा माल है। गन्ना काटने के बाद उसके शक्कर की मात्रा में कमी होने लगती है। अत: गन्ना काटने के २४ घंटे के अंदर वह शक्कर कारखाने में पहुँच जाना चाहिए। गन्ने के कुल भार का लगभग १०% शक्कर बनती है। इस प्रकार गन्ने का ढुलाई-खर्च शक्कर की अपेक्षा अधिक होता है। अत: शक्कर के कारखाने गन्ना उत्पादक क्षेत्रों में ही स्थापित किए जाते हैं।

पहले भारत में शक्कर उद्‌योग का विकास उत्तर प्रदेश तथा बिहार राज्य में हुआ था। जल सिंचाई के साधनों का विकास होने के कारण इसकी खेती अनेक विस्तृत क्षेत्रों में होने लगी। भारत में शक्कर के सबसे अधिक कारखाने उत्तर प्ररदेश में हैं। इसके बाद महाराष्ट्र का स्थान है। महाराष्ट्र के अधिकांश कारखाने सहकारिता के आधार पर खड़े हैं। तमिलनाडु तथा कर्नाटक राज्यों के गन्ने में शक्कर की मात्रा अधिक पाई जाती है।



आकृति १४.३ : भारत : शक्कर उत्पादन

भारत में शक्कर कारखानों तथा शक्कर के उत्पादन में निरंतर वृद्‌धि हो रही है। आज भारत विश्व में एक प्रमुख शक्कर उत्पादक देश है।

खनिज पर आधारित उद्‌योग :

लौह-इस्पात उद्‌योग :

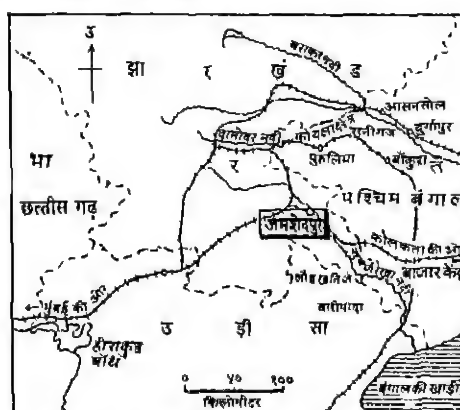
लौह-इस्पात उद्‌योग किसी देश के औद्‌योगिक विकास का आधारस्तंभ होता है। सभी प्रकार की मशीनें, यातायात के साधन, खेती के औजार, गृहनिर्माण व्यवसाय आदि सभी लौह-इस्पात पर अवलंबित हैं।

लौह खनिज को शुद्‌ध कर उससे इस्पात बनाने के लिए लौह खनिज, कोक, चूने का पत्थर, मैंगनीज, पानी आदि की आवश्यकता होती है। इनके अतिरिक्त क्रोमाइट, निकेल, टंगस्टन आदि धातुओं का, विविध प्रकार के इस्पात तैयार करने के लिए उपयोग किया जाता है। लौह-इस्पात के उत्पादन में कोक का लगभग पूर्णत: तथा लौह खनिज का सामान्यत: आधा वजन घट जाता है। इस कारण इस उद्‌योग की स्थापना बहुधा कोयला क्षेत्रों में हुई है। यह कच्चे माल के सानिध्य में स्थापित होने वाला उद्‌योग है। यह एक भारी उद्‌योग है। अत: परिवहन के विशेष साधनों की आवश्यकता होती है। इस उद्‌योग में पूँजी विनियोग की भी अधिक आवश्यकता होती है, परंतु उस अनुपात में रोजगार कम उपलब्ध होता है।

भारत में पहला आधुनिक लौह-इस्पात कारखाना पश्चिम *बंगाल में कुल्टी में स्थापित हुआ था, परंतु बाद में बड़े* पैमाने पर इस्पात उत्पादन करने वाला कारखाना जमशेदपुर में स्थापित हुआ।

इस प्रकार का निजी क्षेत्र में एक कारखाना पश्चिम बंगाल के बर्नपुर में स्थापित किया गया था।

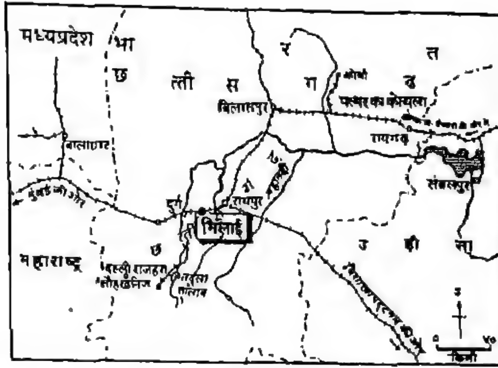
भारत में स्वतंत्रता प्राप्ति के बाद सरकारी क्षेत्र में अनेक स्थानों पर यह उद्‌योग स्थापित किया गया। छत्तीसगढ़ में भिलाई, पश्चिम बंगाल में दुर्गापुरा, उड़ीसा में राउरकेला, झारखंड में बोकारो, तमिलनाडु में सलेम तथा आंध्र प्रदेश के विशाखापट्टनम में यह उद्‌योग स्थापित किया गया है।



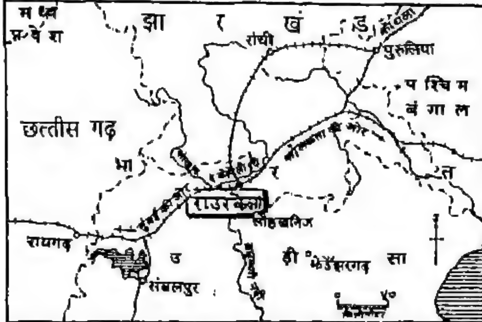
आकृति १४.४ जमशेदपुर लौह-इस्पात उद्‌योग का स्थान

कर्नाटक राज्य के भद्रावती, हास्पेट तथा तमिळनाडु के सलेम के लौह-इस्पात कारखानों को छोड़कर देश में सभी कारखाने प्रमुख कोयला उत्पादन क्षेत्रों के समीप हैं।

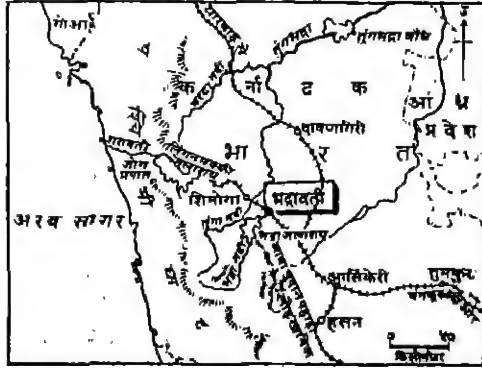
गत ४० वर्षों में लौह-इस्पात उत्पादन में उल्लेखनीय वृद्‌धि हुई है।



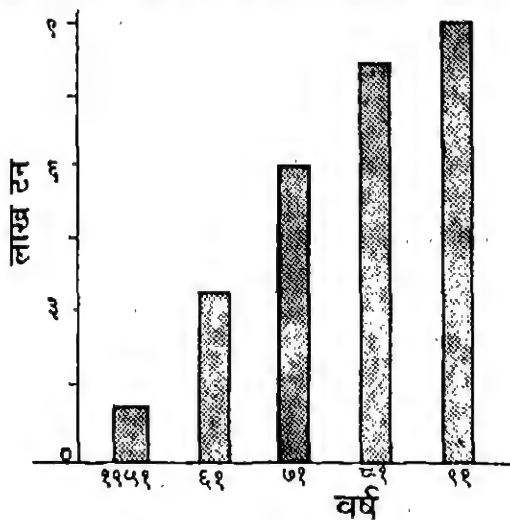
आकृति १४.५ : भिलाई लौह-इस्पात कारखाना का स्थान



आकृति १४.६ : राउरकेला लौह-इस्पात कारखाना का स्थान



आकृति १४.७ : भद्रावती लौह-इस्पात कारखाना का स्थान



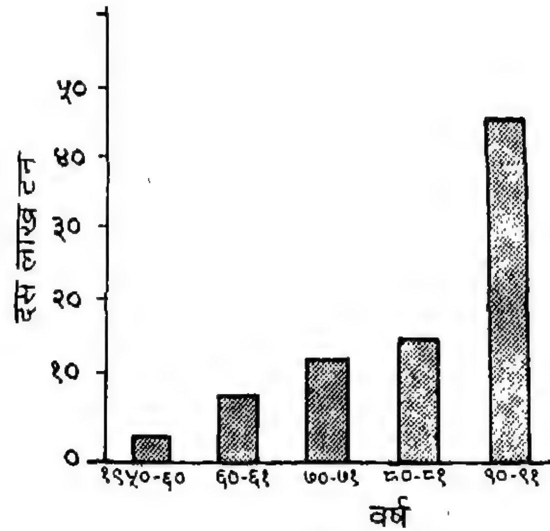
आकृति १४.८ : इस्पात उत्पादन

आज भारत लौह-इस्पात के उत्पादन क्षेत्र में महत्वपूर्ण देश माना जाता है।

सीमेंट उद्योग :

सीमेंट निर्माण-कार्य उद्योग का प्रमुख तत्व है। सीमेंट उद्योग के लिए चूने का पत्थर, चिकनी मिट्टी, जिप्सम, कोयला आदि कच्चे माल की आवश्यकता होती है। चूने का पत्थर तथा अन्य भारी कच्चे माल के ढोने में लगने वाले खर्च का विचार कर सीमेंट के कारखाने कच्चे माल के क्षेत्र में ही स्थापित किए जाते हैं।

भारत में सीमेंट का पहला कारखाना चेन्नई में स्थापित किया गया था। आज देश में तमिलनाडु, मध्य प्रदेश, छत्तीसगढ़, गुजरात, बिहार, झारखंड, राजस्थान, कर्नाटक तथा आंध्रप्रदेश प्रमुख सीमेंट उत्पादक राज्य हैं।



आकृति १४.९ : सीमेंट उत्पादन

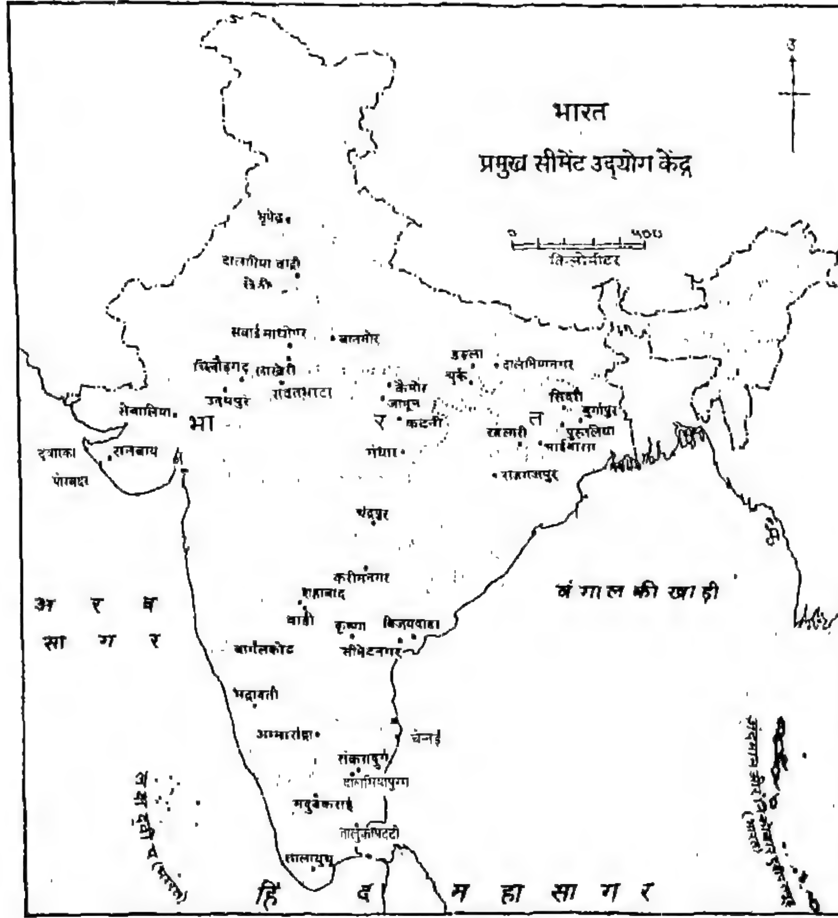
सीमेंट उत्पादन के आरेख से यह स्पष्ट दिखाई देता है कि भारत में १९८०-८१ के बाद सीमेंट उत्पादन में तीव्र वृद्धि हुई है।

भारत में सीमेंट की बढ़ती हुई माँग के कारण भविष्य में इसके विकास की अच्छी संभावना है।

खनिजों पर आधारित उपर्युक्त दो उद्योगों के अतिरिक्त, अल्युमिनियम, अभियांत्रिकी, यातायात के साधन, रासायनिक खाद, रासायनिक पदार्थ आदि उद्योग खनिजों पर आधारित हैं।

स्वतंत्रता के बाद भारत में औद्योगिक प्रगति बड़ी तेजी से हुई है। अधिक-से-अधिक कच्चे माल से तैयार माल बनाकर उसे निर्यात करने को प्रधानता दी गई। ऊर्जा पूर्ति की कमी, अपर्याप्त यातायात के साधन, कुशल श्रमिकों का अभाव आदि उद्योगों के विकास में कुछ बाधाएँ हैं। कारखानों वाले क्षेत्रों में वायु, भूजल तथा ध्वनि प्रदूषण की समस्या प्रतिदिन बढ़ती जा रही है। आज इस बात पर गंभीरता से विचार किया जा रहा है कि पर्यावरण का संतुलन बिगाड़े बिना कैसे औद्योगिक विकास किया जाए।

ई. स. १९९१ की औद्योगिक नीति ने विदेशी पूँजीपतियों को भारत में पूँजी निवेश के लिए प्रोत्साहित किया है। अनिवासी भारतीयों का भी आवाहन किया गया है। ऐसी आशा है कि इनसे



आकृति १४.१० : सीमेंट उत्पादन के प्रमुख केंद्र

नए उद्योग प्रारंभ होंगे । सरकारी नीति का उद्देश्य है कि बड़े पैमाने पर तैयार वस्तुओं का निर्यात कर उससे विदेशी मुद्रा अर्जित की जाए । हमें आशान्वित होना है कि इसके द्‍वारा समृद्ध औद्योगिक भारत का निर्माण होगा ।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :

क. भारत में सर्वाधिक शक्कर कारखाने .... राज्य में हैं ।

ख. देश में पहला लौह-इस्पात कारखाना .... में स्थापित हुआ था ।

ग. आंध्र प्रदेश में .... लौह-इस्पात कारखाना स्थापित किया गया है ।

२. उचित जोड़ियाँ लगाओ :

'क' समूह (उद्योग केंद्र)	'ख' समूह (उद्योग)
घ. अहमदाबाद	१. सीमेंट
छ. मिलाई	२. लौह-इस्पात
ज. चेन्नई	३. शक्कर
	४. रसायन
	५. वस्त्र

३. कारण लिखो :

ट. तैयार माल के लिए भारत एक विस्तृत बाजार है ।

ठ. देश में उद्योग-धंधों के विकास की अच्छी संभावना है ।

ड. भारत में वस्त्र उत्पादन में वृद्धि हुई है ।

ढ. शक्कर के कारखाने गन्ना उत्पादक क्षेत्रों में स्थापित किए जाते हैं ।

ण. लौह - इस्पात उद्योग को देश की प्रगति का आधार समझा जाता है ।

४. निम्नांकित प्रश्नों के उत्तर लिखो :

त. उद्योगों के स्थानीयकरण संबंधी जानकारी संक्षिप्त में लिखो ।

थ. भारत के लौह-इस्पात उद्योग के संबंध में संक्षिप्त जानकारी दो ।

द. भारत में उद्योग-धंधों का विकास क्यों हो रहा है ?

५. भारत की रेखाकृति में निम्नांकित को दर्शाकर यथास्थान नाम लिखो:

१. अहमदाबाद वस्त्रोद्‍योग केंद्र

२. दुर्गापुरा लौह-इस्पात केंद्र

३. भारत के प्रथम सीमेंट उद्योग का केंद्र

४. पूर्वी किनारे पर लौह-इस्पात केंद्र

(आ)

किसी कारखाने में जाकर यह जानकारी प्राप्त करो कि उसके स्थानीयकरण में कौन-से तत्व कारणीभूत हैं तथा उससे उत्पादित माल कहाँ भेजा जाता है ।

प्रकरण १५

यातायात के साधन : सड़कें तथा रेलमार्ग

किसी देश के विकास के लिए यातायात के साधन आवश्यक होते हैं। उद्योग-धंधों में लगने वाला कच्चा माल, श्रमिक, मशीनों आदि की पूर्ति के लिए यातायात के साधन सहायक होते हैं। इनके द्वारा तैयार माल बाजार तथा उपभोक्ताओं तक पहुँचाया जाता है। यातायात के साधनों की उपलब्धता पर ही देश का आर्थिक तथा सामाजिक विकास अवलंबित है। हमने इसे कृषि तथा उद्योग-धंधों का अध्ययन करते समय देखा भी है।

मानव की आर्थिक क्रियाओं को अधिक कार्यक्षम बनाने के लिए यातायात के साधनों की विशेष आवश्यकता होती है। अपने देश के दुर्गम भागों में यातायात के अभाव के कारण विकास कम हुआ है। देश में यातायात का घना जाल आवश्यक है। आज की अर्थव्यवस्था का मूल सूत्र है कि यातायात का जाल जितना अधिक होगा उतना ही अधिक आर्थिक विकास संभव होगा। यातायात के साधन विकास के आधारभूत साधन माने जाते हैं।

यातायात के साधन देश तथा विदेश के लोगों को एकत्र करते हैं। इससे उनके विचारों का आदान प्रदान होता है, जिससे परस्पर सहयोग बढ़ता है। भारत जैसे विशाल देश में लोगों की आवश्यकता की पूर्ति के लिए वस्तुओं का वितरण यातायात के साधनों द्वारा ही संभव हुआ है। यातायात के साधन, अकाल तथा भूकंप सदृश प्राकृतिक आपदाओं तथा देश की सुरक्षा की दृष्टी से महत्वपूर्ण हैं। अतः देश का आर्थिक तथा सामाजिक विकास यातायात के साधनों पर अवलंबित है।

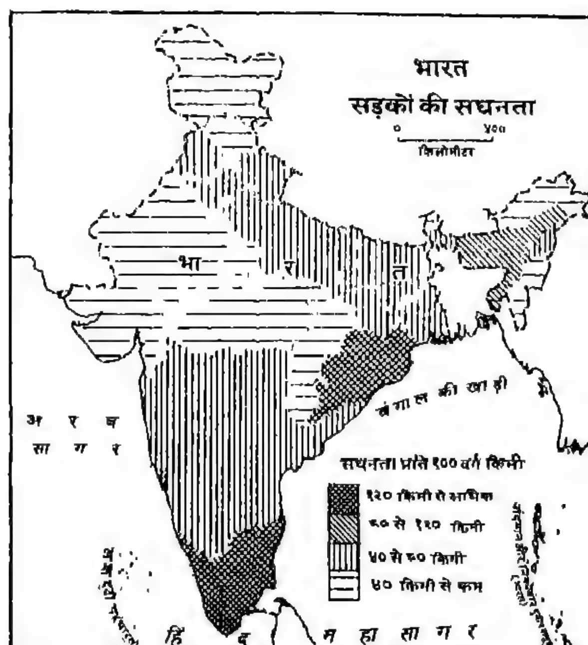
यातायात के मार्ग :

यातायात के मार्गों का वर्गीकरण स्थलमार्ग, जलमार्ग तथा वायुमार्ग के रूप में किया जाता है। स्थलमार्ग के दो प्रकार–सड़क तथा रेलमार्ग हैं। देश के आंतरिक यातायात की दृष्टि से सड़कों तथा रेलमार्गों का महत्व है।

सड़कें :

भारत के विस्तृत भूप्रदेश में अनेक गाँव तथा शहर दूर-दूर फैले हुए हैं। इनका एक-दूसरे से संबंध सड़कों द्वारा ही संभव हुआ है। रेलमार्ग बनाने की अपेक्षा सड़कें बनाने में कम खर्च होता है। सड़कें ही ग्रामीण तथा शहरी भागों को जोड़ सकती हैं। सामान्यतः जिन प्रदेशों में प्राथमिक अवस्था के आर्थिक विकास के कार्य होते हैं, वहाँ प्रायः कच्ची सड़कें ही होती हैं। भारत में पक्की सड़कों की अपेक्षा कच्ची सड़कों की लंबाई अधिक है।

देश के संपूर्ण यातायात-मार्गों की लंबाई की ८५% लंबाई सड़कों की है। इससे सड़कों का महत्व प्रमाणित होता है। भारत में सड़कों की लंबाई ३० लाख किमी. से अधिक है। सड़कों द्वारा बहुत-से स्थान परस्पर जुड़ गए हैं, फिर भी बहुत-से स्थान अभी सड़कों से दूर हैं। भारत में केरल, गोआ, उड़ीसा, तमिळनाडु तथा त्रिपुरा राज्यों में सड़कों का घनत्व सबसे अधिक है। हिमाचल प्रदेश, मणिपुर, मध्य प्रदेश, उत्तरांचल, सिक्किम तथा जम्मू-कश्मीर राज्यों में इसका घनत्व कम है। साधारणतः पर्वतीय तथा रेगिस्तानी प्रदेशों में सड़कों का घनत्व कम मिलता है।



आकृति १५.१ : भारत : सड़कों का घनत्व

सड़कों के प्रकार :

महत्व के अनुसार सड़कों के चार प्रकार किए जाते हैं।

१. राष्ट्रीय महामार्ग
२. राज्य महामार्ग
३. जिले की सड़कें
४. ग्रामीण सड़कें

१. राष्ट्रीय महामार्ग :

देश के राज्यों की राजधानियों, मुख्य शहरों, बड़े-बड़े औद्योगिक तथा व्यापारिक केंद्रों, प्रमुख बंदरगाहों तथा सेना के महत्वपूर्ण स्थानों को जोड़ने वाली लंबी सड़कें बनाई गई हैं। इन सड़कों को राष्ट्रीय महामार्ग कहा जाता है। यद्यपि ये सड़कें विभिन्न राज्यों से गुजरती हैं, पर ये केंद्र सरकार के प्रबंध के अंतर्गत हैं। इनका विकास तथा देखभाल करने के लिए एक स्वतंत्र विभाग है। आज देश में ३४६०० किमी. से अधिक लंबे राष्ट्रीय महामार्ग हैं। देश की कुल सड़कों की लंबाई का मात्र १% राष्ट्रीय महामार्गों की लंबाई है, पर ३३% वाहन उस पर चलते हैं।

आज राष्ट्रीय महामार्ग द्वारा वस्तुओं की बहुत अधिक मात्रा में ढुलाई होती है । राज्य महामार्गों को राष्ट्रीय महामार्गों से तथा जिले की सड़कों को राज्य महामार्गों से जोड़ देने के कारण माल को दूर-दराज के बाजारों में भी शीघ्र पहुँचने की सुविधा हो गई है।

२. राज्य महामार्ग :

इस प्रकार के महामार्गों का निर्माण तथा व्यवस्थापन राज्य सरकार द्वारा किया जाता है । अधिकतर राज्य महामार्ग राष्ट्रीय महामार्गों से जोड़ दिए जाते हैं। राज्य महामार्गों से जिला मार्ग आकर मिलते हैं। अत्यल्प आवश्यकता कार्यक्रम के अंतर्गत अधिकतर गाँवों को सड़कों द्वारा जोड़ने की योजना कार्यान्वित हो रही है।

३. जिले की सड़कें :

जिले के महत्वपूर्ण गाँवों तथा बाजारों को जोड़ने वाली सड़कें प्रत्येक जिलें में बनाई गई हैं । इन सड़कों की देखभाल जिला परिषदें करती हैं।

४. ग्रामीण सड़कें :

ये सामान्यत: कच्ची सड़कें होती हैं। इन सड़कों से वर्षाकाल में यातायात संभव नहीं होता । कृषि तथा वन के विविध उत्पादनों को शहरों तक पहुँचाने में ये महत्वपूर्ण भूमिका निभाती हैं ।

देश की आर्थिक तथा सामाजिक प्रगति में सड़कों का महत्वपूर्ण योगदान है। सड़कें कम तथा मध्यम दूरी की यात्रा के लिए बहुत उपयुक्त होती हैं। सड़कों के कुछ प्रमुख लाभ हैं- उनका लचीलापन, विश्वसनीयता, गति तथा सीधे बाजारों या उपभोक्ताओं तक वस्तुओं को पहुँचाना । सड़कें यातायत के दूसरे साधनों के लिए पूरक का काम करती हैं।

रेलमार्ग :

भारत में पहला रेलमार्ग ई.स. १८५३मुंबई से ठाणे तक बनाया गया था। इसके बाद देश के मैदानी तथा आर्थिक दृष्टि से महत्वपूर्ण प्रदेशों में रेलमार्गों का निर्माण हुआ । आज भारत में रेलमार्गों की लंबाई ६२९०० किमी. से कुछ अधिक है । रेलमार्गों की लंबाई की दृष्टि से भारत एशिया में प्रथम तथा विश्व में चौथा स्थान रखता है । संपूर्ण रेलमार्ग केंद्र सरकार के नियंत्रण में है।

रेलमार्गों का वितरण :

भारत में रेलमार्गों के वितरण का मानचित्र देखने से यह ज्ञात होता है कि उत्तरी मैदानी भाग में हावड़ा से अमृतसर तक रेलमार्ग का घना जाल बिछा हुआ है । इसमें दिल्ली, कानपुर, लखनऊ, मुगलसराय,आगरा तथा पटना प्रमुख केंद्र हैं । यह मंद ढलानवाला विस्तृत मैदानी प्रदेश कृषि तथा औद्योगिक वस्तुओं का उत्पादक है ।

कृषि उत्पादन के अतिरिक्त खनिजों की उपलब्धता तथा उद्योग-धंधों की प्रगति भी रेलमार्गों के निर्माण में सहायक होती हैं। किसी स्थान पर खनिज पदार्थ पाए जाते हैं और यदि वह स्थान पठारी तथा पर्वतीय हो तो भी वहाँ रेलमार्गों का निर्माण हुआ है । छोटा नागपुर का पठार इसका उत्तम उदाहरण है ।

तंत्र ज्ञान के बढ़ने के कारण आज पश्चिमी तटवर्ती भाग में ऊँचे-नीचे प्रदेश में भी कोकण रेलवे का निर्माण कार्य बड़ी तेजी से चल रहा है। पूर्वी तटवर्ती प्रदेश में जिस प्रकार कोलकता तथा चेन्नई रेलमार्ग से जुड़े हैं, वैसे ही पश्चिमी तट पर मुंबई तथा कोचीन को जोड़ा जा रहा है । भारतीय पठारी प्रदेश में, गुजरात तथा तमिलनाडु में रेलमार्गों का घना जाल बिछा हुआ है । हिमालय के तराई क्षेत्र, जम्मू-कश्मीर, असम राज्य तथा राजस्थान के रेगिस्थानी क्षेत्रों में बहुत कम रेलमार्ग हैं ।

रेलमार्गों के प्रकार :

भारत में रेलमार्ग के तीन प्रकार-बड़ी लाइन, छोटी लाइन तथा सँकरी लाइन हैं । रेल में भिन्न-भिन्न प्रकार के मार्ग यातायत की कार्यक्षमता में असुविधाजनक होते हैं । इनके कारण यात्रा या सामानों को लाने-ले जाने में गाड़ी बदलनी पड़ती है । इससे यातायात का खर्च बढ़ जाता है । साथ ही एक स्थान से दूसरे स्थान पर सामान भेजने में विलंब होता है । इसीलिए भारत के सभी रेलमार्गों का रूपांतरण बड़ी लाइन में करने के दीर्घकालीन प्रकल्प कार्यान्वित किए जा रहे हैं ।

देश के संपूर्ण रेलमार्ग की लंबाई की ५६% लंबाई बड़ी लाइन की है । नए रेलमार्ग बड़ी लाइन के ही बनाए जा रहे हैं।

रेलमार्ग के विभाग :

इतने बड़े देश में रेलमार्गों की व्यवस्था एक स्थान से करने में सरकार तथा जनता दोनों को बड़ी असुविधा होती । अत: रेलमार्गों के उचित विकास तथा व्यवस्थापन के लिए संपूर्ण रेलमार्गों को ९ विभागों में बाँटा गया है ।

रेलमार्ग के विभाग

विभागों के नाम	मुख्यालय
(१) मध्य विभाग	मुंबई
(२) पश्चिम विभाग	मुंबई
(३) उत्तर विभाग	नई दिल्ली
(४) उत्तर-पूर्व विभाग	गोरखपुर
(५) पूर्वोत्तर सीमा विभाग	मालीगाँव (गुवाहाटी)
(६) पूर्व विभाग	कोलकता
(७) दक्षिण-पूर्व विभाग	कोलकता
(८) दक्षिण-मध्य विभाग	सिकंदराबाद
(९) दक्षिण विभाग	चेन्नई

भारत के कुछ महत्त्वपूर्ण रेलमार्ग :

मुंबई-दिल्ली मार्ग :

रेल द्वारा मुंबई से दिल्ली जाने के लिए दो मार्ग हैं। मध्य रेल मार्ग नाशिक, भुसावल, इटारसी, झाँसी, आगरा, मथुरा आदि महत्वपूर्ण स्टेशनों से होकर जाता है ।

पश्चिम रेलमार्ग से मुंबई-दिल्ली प्रवास करने पर सूरत, बड़ोदरा, रतलाम, मथुरा आदि स्टेशन आते हैं ।

मुंबई कोलकता मार्ग :

मुंबई से कोलकता जाने के लिए दो मार्ग हैं। एक नागपुर तथा दूसरा इलाहाबाद होकर जाता है ।

नागपुर मार्ग से जाते हुए मनमाड, भुसावल, वर्धा, नागपुर, रायपुर, टाटानगर आदि महत्वपूर्ण स्टेशन आते हैं।

इलाहाबाद मार्ग से जाते समय भुसावल, इटारसी, जबलपुर, इलाहाबाद, रानीगंज आदि महत्वपूर्ण स्टेशन आते हैं ।

मुंबई- चेन्नई (मद्रास) रेलमार्ग :

पुणे, सोलापुर, रायचुर तथा गुंटकल महत्वपूर्ण स्टेशन इस मार्ग में आते हैं।

पुणे-बंगलूर मार्ग :

इस रेलमार्ग पर मिरज, बेलगाँव, हुबली, अरसिकेरी आदि मुख्य स्टेशन स्थित हैं।

चेन्नई (मद्रास)-दिल्ली मार्ग :

इस रेलमार्ग पर विजयवाड़ा, काजीपेठ, वर्धा, नागपुर, इटारसी, झाँसी आदि महत्वपूर्ण स्टेशन हैं।

गोरखपुर से तीनसुकिया :

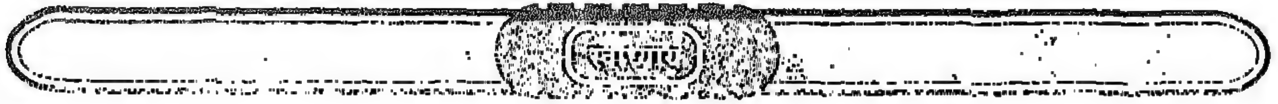
भारत की सुरक्षा की दृष्टि से यह रेलमार्ग बहुत महत्वपूर्ण है। उत्तर-पूर्व सीमावर्ती क्षेत्र देश के शेष भागों से मिलाने वाला एकमात्र रेलमार्ग है। इस रेलमार्ग पर रंगिया, तेजपुर, लखीमपुर आदि महत्वपूर्ण रेल स्थानक हैं।

रेलमार्गों का विद्युतीकरण :

भारत में बिजली से चलने वाले इंजिनों का उपयोग बढ़ रहा है। इस प्रकार कोयला जैसे महत्वपूर्ण औद्योगिक ईंधन की बचत होती है। विगत कुछ वर्षों से रेलों का विद्युतीकरण बड़ी तेजी से हो रहा है। आठवीं पंचवर्षीय योजना में विद्युतीकरण पर विशेष ध्यान दिया गया है।

भारत में कुछ महानगरों में जनसंख्या वृद्धि तथा स्थान की कमी के कारण भूमिगत रेलमार्ग की आवश्यकता प्रतीत होने लगी है। आज दो भूमिगत रेलमार्ग कोलकता के उपनगरों में हैं।

भारत के आर्थिक, औद्योगिक तथा सामाजिक विकास में रेलमार्ग महत्वपूर्ण भूमिका निभाती है। इनके कार्य एक दूसरे के लिए पूरक सिद्ध होते हैं। इन साधनों की उपलब्धता के कारण लोग देश के एक भाग से दूसरे भाग का प्रवास करते हुए लंबी यात्राओं पर जाते हैं। इससे देशवासियों में एकात्मकता की भावना निश्चित रूप से बढ़ती है।



(अ)

१. (अ) रिक्त स्थानों में उचित शब्द लिखो :

क. भारत में .... से .... पहला रेलमार्ग बनाया गया था।

ख. देश में कुल रेलमार्गों की लंबाई का .... बड़ी लाईन है।

ग. भारत में रेलमार्ग के कुल.............. विभाग किए गए हैं।

घ. भूमिगत रेलमार्ग .... शहर में बनाया गया है।

ड. उपभोक्ताओं तक वस्तुओं को पोंहुचाना .... का फायदा है।

२. उचित जोड़ियाँ लगाओ :

'क' समूह (रेलमार्ग विभाग)	'ख' समूह (मुख्यालय)
च. मध्य विभाग	१. गोरखपुर
छ. उत्तर विभाग	२. सिकंदराबाद
ज. दक्षिण विभाग	३. चेन्नई
झ. दक्षिण-मध्य विभाग	४. नई दिल्ली
ञ. उत्तर-पूर्व विभाग	५. मुंबई
	६. मालीगाँव

३. कारण लिखो :

ट. राजस्थान में सड़कों का धनत्व कम है।

ठ. भिन्न-भिन्न प्रकार के रेलमार्ग यातायात के दृष्टि से असुविधाजनक हैं।

ड. देश के आर्थिक तथा सामाजिक विकास में सड़कों का महत्वपूर्ण योगदान है।

ढ. उत्तर भारत के मैदान में रेलमार्गों का जाल बिछा हुआ है।

४. निम्नलिखित प्रश्नों के उत्तर लिखो :

त. यातायात के साधनों के प्रमुख प्रकार बताते हुए भारत के सड़क यातायात का वर्णन करो।

थ. भारत के रेलमार्गों की जानकारी लिखो।

द. यातायात के साधनों का लाभ लिखो।

५. भारत की रेखाकृति में निम्नलिखित दर्शाते हुए यथास्थान उनके नाम :

१. मुंबई- चेन्नई रेलमार्ग

२. कोलकता-अमृतसर राष्ट्रीय महामार्ग

३. दक्षिण-मध्य रेल्वे विभाग का मुख्यालय

४. दिल्ली- चेन्नई रेलमार्ग

५. मुंबई-आगरा महामार्ग

६. पुणे-बंगलूरु रेलमार्ग

(आ)

बस स्टेशन या रेलवे स्टेशन जाकर सड़क यातायात तथा रेल यातायात की जानकारी एकत्र करो।

* * *

प्रकरण १६

जलमार्ग, वायुमार्ग तथा संचार साधन

हमने देखा कि देशांतर्गत यातायात के लिए सड़कों तथा रेल मार्गों का विशेष महत्व है किंतु विश्व संपर्क के लिए जलमार्ग तथा वायुमार्ग अधिक महत्वपूर्ण हैं । आजकल विभिन्न देशों के बीच व्यापार में प्रचंड वृद्धि हुई है । इसीलिए जलमार्ग तथा वायुमार्ग का विकास अधिक महत्वपूर्ण है ।

ऐसा कहा जाता है कि आज विश्व समीप आ गया है । इसका अर्थ है कि हम विश्व के एक भाग से दूसरे भाग तक कम समय में तीव्र गतिमान यातायात के साधनों द्वारा पहुँच सकते हैं। इन साधनों द्वारा संसार में बड़े पैमाने पर वस्तुओं का व्यापार प्रारंभ हुआ है तथा लोग भी प्रवास करने लगे हैं । विचारों के आदान-प्रदान को गति मिलने के कारण उत्साही लोग विश्व-भ्रमण करने लगे हैं ।

सड़कों तथा रेलमार्गों की तुलना में जलयातायात कम खर्चीला होता है । जलमार्ग प्राकृतिक होते हैं, अतः इनकी दुरुस्ती का प्रश्न ही नहीं उठता । भारी परंतु कम मूल्यवाले खनिज पदार्थ, भारी यंत्र-सामग्री, कोयला, अनाज आदि का यातायात जलमार्ग द्वारा सुविधाजनक तथा लाभदायक होता है । बीसवीं शताब्दी में तांत्रिक प्रगति के परिणामस्वरूप स्वचलित जलयानों का निर्माण हुआ है । इन जहाजों पर शीतगृह तथा अन्य सुविधाएँ होती हैं । इस कारण नाशवान वस्तुएँ भी दूर-दराज के क्षेत्रों में भेजी जा सकती हैं । परिणामस्वरूप पहले मूल्यवान, टिकाऊ तथा अनाशवान वस्तुओं तक सीमित व्यापार प्रथम महायुद्ध के बाद अन्य वस्तुओं के लिए भी बड़े पैमाने पर बढ़ गया है ।

जलमार्ग के प्रकार :

जलमार्ग के तीन प्रकार किए जाते हैं ।

(१) आंतरिक जलमार्ग

(२) तटवर्ती जलमार्ग

(३) समुद्री जलमार्ग

(१) आंतरिक जलमार्ग :

देश के अंदर व्यापार के लिए नदियों तथा नहरों का उपयोग किया जाता है । जो नदियाँ तथा नहरें यातायात के काम आती हैं उन्हें आंतरिक जलमार्ग कहा जाता है । यद्यपि यहाँ पर बहुत-सी नदियाँ जल यातायात के लिए उपयोगी हैं । तथापि देश के कुल यातायात में देशांतर्गत जलमार्ग यातायात की मात्रा बहुत कम है ।

देश की प्रमुख नदियों का ५२०० किमी. लंबा प्रवाह यांत्रिक नौकाओं के लिए उपयुक्त है लेकिन उसमें से मात्र १७०० किमी. लंबे प्रवाह का प्रत्यक्ष उपयोग होता है । इसी प्रकार केवल ४८५ किमी. लंबी नहरों का उपयोग देश में यांत्रिक नौकाओं के लिए किया जा सकता है । परंतु प्रत्यक्ष में बहुत कम लंबाई तक नहरें यातायात के लिए उपयोग में लाई जाती हैं । अतः देश में आंतरिक जलमार्ग बढ़ाना आवश्यक है ।

हमारे देश में बहुत पहले से गंगा तथा ब्रह्मपुत्र नदियों का उपयोग जल यातायात में होता था । इस प्रकार गोदावरी, कृष्णा, महानदी, ताप्ती, नर्मदा तथा मांडवी नदियों के मुहानों के प्रवाह में जलयातायात होता है ।

नदियों तथा नहरों का यातायात के लिए उपयोग उनकी पर्याप्त गहराई, निरंतर तथा नियमित जलपूर्ति पर निर्भर है ।

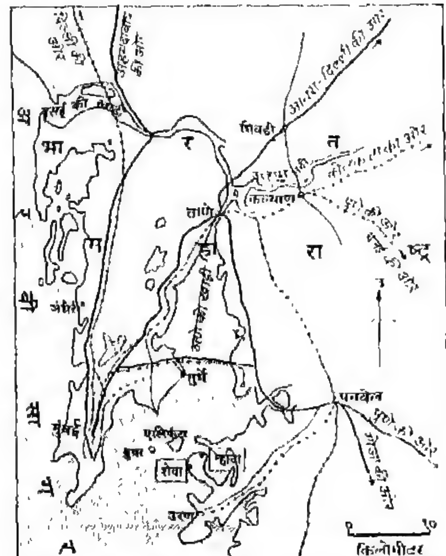
(२) तटवर्ती जलमार्ग:

देश के विशाल क्षेत्र, प्रादेशिक भिन्नता तथा भौगोलिक विविधता के फलस्वरूप विभिन्न राज्यों में विभिन्न प्रकार की वस्तुओं का उत्पादन होता है । देश के विविध भागों के लोगों को वस्तुओं की पूर्ति करने के लिए सड़कों तथा रेलों के साथ ही तटवर्ती मार्गों का उपयोग देश के विभिन्न भागों में वस्तुओं की पूर्ति करने में होता है । सड़कों तथा रेलों पर दबाव कम करने की दृष्टि से इस जलमार्ग का विशेष महत्व है ।

(३) समुद्री जलमार्ग तथा बंदरगाह :

तटवर्ती तथा सागरीय यातायात में बंदरगाहों का विशेष महत्व होता है । जिस प्रकार बस तथा रेलवे के स्टेशन होते हैं, उसी प्रकार बंदरगाह जलमार्ग के स्टेशन होते हैं ।

बंदरगाह जहाजों की मरम्मत, माल के उतारने-चढ़ाने तथा जलयानों के लंगर डालने के लिए उपयोगी होते हैं । बंदरगाह के प्राकृतिक तथा कृत्रिम दो प्रकार होते हैं । प्राकृतिक बंदरगाह कटे-फटे किनारों पर पाए जाते हैं । यहाँ पानी शांत तथा गहरा होता है । इस प्रकार के बंदरगाहों में जलयानों को समुद्री लहरें तथा तूफानी हवाओं से अच्छा संरक्षण मिलता है । कटा-फटा किनारा न होने पर सुविधा की दृष्टी से वहाँ कृत्रिम बंदरगाहों का निर्माण किया जाता है।



आकृति क्र. १६.१ मुंबई - न्हावाशेवा बंदरगाह

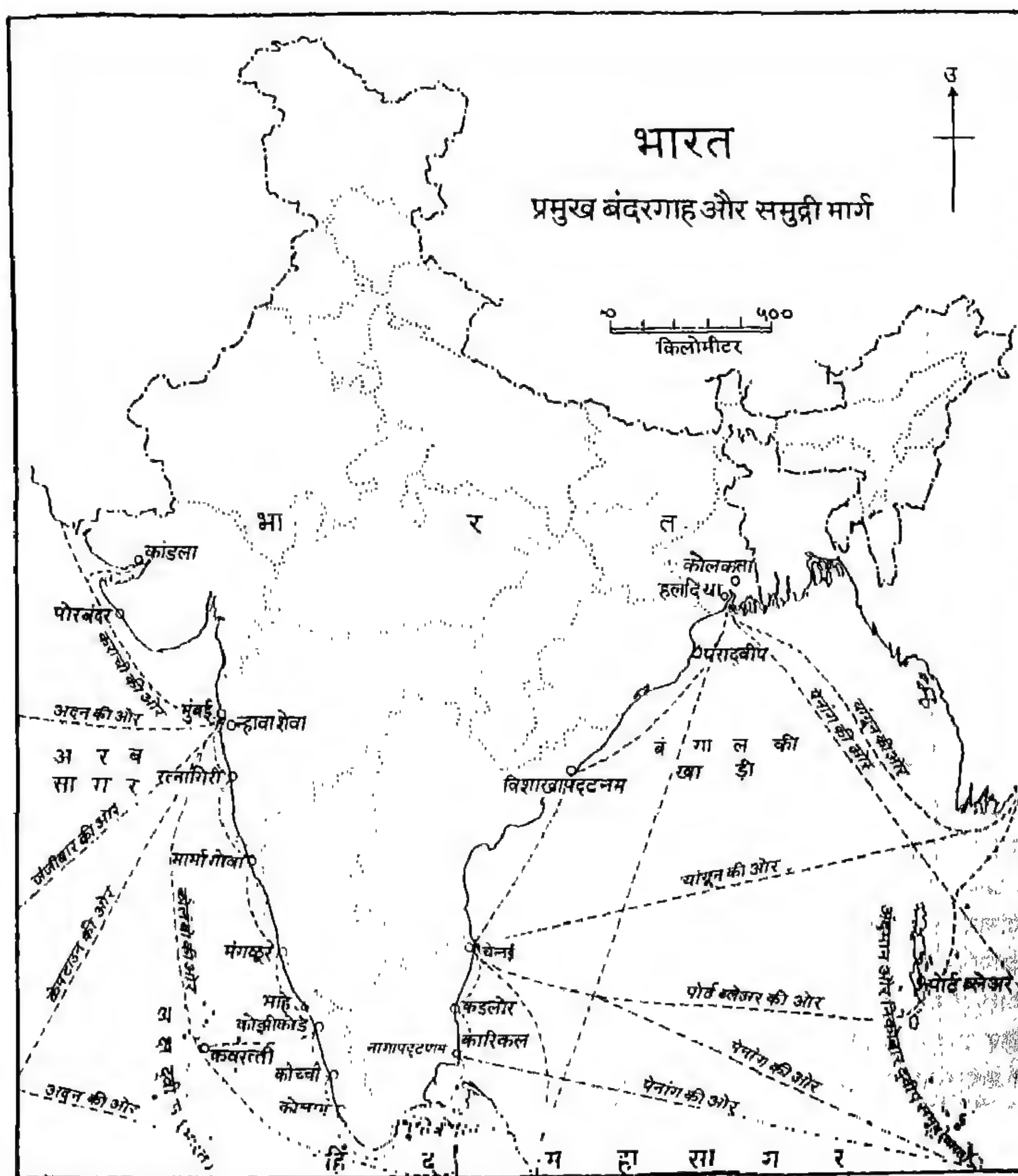
भारत का पश्चिमी किनारा पूर्वी किनारे की तुलना में अधिक गहरा और कटा-फटा है। अत: पश्चिमी किनारे पर अच्छे बंदरगाह हैं।

पश्चिमी किनारे पर कांडला, मुंबई, मार्मागोवा, नया मंगलूर, कोचीन तथा जवाहरलाल नेहरू नामक न्हावा-सेवा कुल प्रमुख छह बंदरगाह हैं। पूर्वी किनारे पर तूतीकारेन, चेन्नई, विशाखापटनम, पाराद्वीप, कोलकता, हल्दिया आदि प्रमुख बंदरगाह हैं। इनके अतिरिक्त अनेक छोटे बंदरगाह हैं।

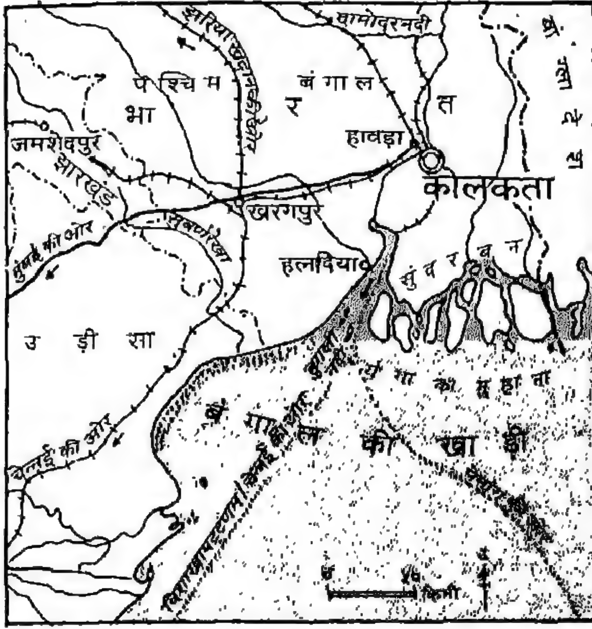
प्रमुख बंदरगाह तथा व्यापार :

भारत का उत्तम प्राकृतिक बंदरगाह होने के कारण कुल प्रमुख बंदरगाहों के व्यापार का २०% व्यापार केवल मुंबई बंदरगाह से होता है। यहाँ के व्यापार में मुख्यत: खनिज पदार्थ, खनिज तेल, अनाज, मशीनों आदि का समावेश है। गुजरात राज्य में **कांडला** बंदरगाह से विविध प्रकार के खनिज तेल, नमक, सीमेंट, रासायनिक खाद, अनाज, कपास, शक्कर आदि का व्यापार होता है। गोआ में **मार्मागोवा** बंदरगाह से बड़े पैमाने पर कच्चा लोहा तथा बाक्साइट का निर्यात होता है। कर्नाटक राज्य के **नया मंगलूर** बंगरगाह से कच्चा लोहा, रासायनिक खाद, खाद्य तेल, ग्रेनाइट पत्थर आदि का निर्यात होता है। इनके अतिरिक्त पश्चिमी तट पर दक्षिणी भाग में कोच्ची बंदरगाह हैं।

पूर्वी किनारे पर चेन्नई तथा कोलकता पुराने तथा व्यापारिक दृष्टि से महत्वपूर्ण बंदरगाह हैं। कोलकता बंदरगाह हुगली नदी पर स्थित है। नदी के तल में मिट्टी भरने के कारण कभी-कभी जहाजों के आने में कठिनाई होती है। इसलिए कोलकता के समीप ही आधुनिक सुविधाओं से सुसज्ज **हलदिया** बंदरगाह का विकास किया गया है।



आकृति क्र. १६.२ भारत : प्रमुख बंदरगाह तथा समुद्री मार्ग



आकृती क्र. १६.३ कोलकता पार्श्वभूमि

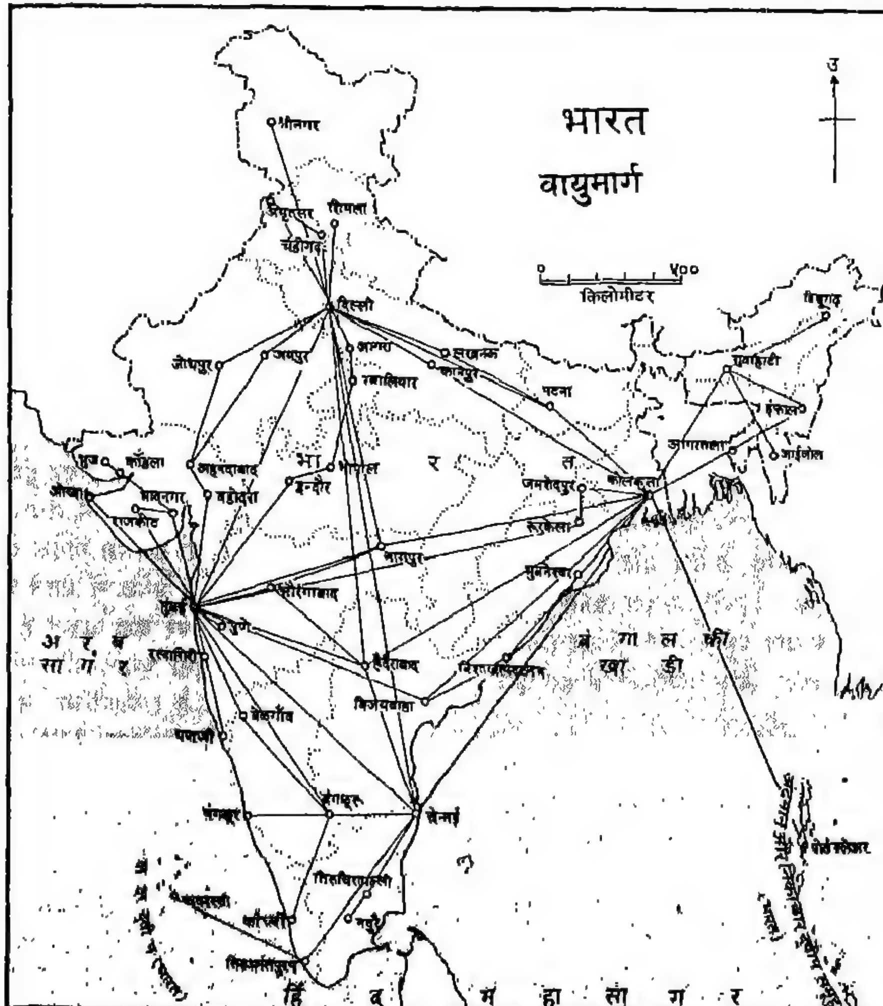
पूर्वी किनारे के इस बंदरगाह की पार्श्वभूमि में अनेक प्रकार के कृषि उत्पादन, खनिज पदार्थ तथा औद्योगिक वस्तुएँ उत्पन्न होती हैं। अत: इस बंदरगाह से भारत का बहुत अधिक व्यापार होता है। विशाखापटनम गहरा बंदरगाह है। यहाँ से कच्चे लोहे का निर्यात करने के लिए विशेष सुविधाएँ उपलब्ध कराई गई हैं।

भारत के पश्चिमी किनारे पर मार्मागोवा के दक्षिण में कारवार बंदरगाह का विकास किया गया है। यह सभी प्रकार की आधुनिक सुविधाओं से युक्त उत्तम बंदरगाह है। इसकी पार्श्वभूमि में लोहा, मैंगनीज आदि खनिज पदार्थ; ग्रेनाइट पत्थर, कृषि, वन तथा सागरीय संपत्ति बड़ी मात्रा में उपलब्ध हैं। इसके समीप एक ताप विद्युत केंद्र तथा पेट्रो-केमिकल रसायन का कारखाना स्थापित किया जा रहा है। इससे इस बंदरगाह का महत्व बढ़ जाएगा।

भारत से स्वेज नहर होकर यूरोप की ओर जाने वाला एक प्रमुख जलमार्ग है। यह उत्तरी अमेरिका के पूर्वी किनारे तक जाता है। इससे सहज ही व्यापार को बड़ी गति मिली है। इसी प्रकार भारत का दूसरा प्रमुख जलमार्ग सिंगापुर होकर पूर्व की ओर चीन तथा जापान तक जाता है। तीसरा जलमार्ग भारत से पश्चिम की ओर अफ्रीकी देशों तक जाता है। आस्ट्रेलिया की ओर जाने वाला जलमार्ग कोलंबो बंदरगाह होकर जाता है।

वायुमार्ग :

वायुमार्ग बहुत तेज गति तथा महँगा यातायात साधन है। भूपृष्ठ और जलवायु की विभिन्नता तथा व्यापारिक और औद्योगिक केंद्रों के एक-दूसरे से बहुत दूर स्थित होने के कारण भारत जैसे विशाल देश में वायुमार्ग का विशेष महत्व है।



आकृति क्र. १६.४ भारत प्रमुख वायुमार्ग तथा हवाई अड्डे

हमारा देश पूर्वी गोलार्ध के मध्य स्थित है। इसलिए यूरोप से सुदूर पूर्व तथा आस्ट्रेलिया की ओर जाने वाले वायुमार्ग भारत होकर जाते हैं। इस प्रकार पश्चिम में दक्षिण अफ्रीका और पूर्व में चीन, जापान आदि देश भारत से वायुमार्ग द्वारा जुड़े हैं।

भारत में वायुमार्ग की व्यवस्था तथा संचालन सरकारी स्वायत्त संस्था द्वारा होता है। 'एअर इंडिया' संस्था विदेशी यात्रियों तथा वस्तुओं के यातायात की देख-भाल करती है। दिल्ली, मुंबई, चेन्नई, कोलकता तथा तिरुवनंतपुरम अंतर्राष्ट्रीय हवाई अड्डे हैं। भारत विश्व में लगभग सभी देशों से वायुमार्ग द्वारा जुड़ा हुआ है।

देशांतर्गत वायुमार्ग की व्यवस्था 'इंडियन एअरलाइन्स' करती है। इंडियन एअरलाइन्स देश के अंदर यात्री, सामान तथा डाक ढोने के लिए बहुत उपयोगी है। इंडियन एअरलाइन्स द्वारा इस प्रकार की सेवाएँ पड़ोसी देशों के लिए भी की जाती हैं।

पूर्वोत्तर पर्वतीय राज्यों के लोगों की आवश्यकता पूर्ति के लिए १९८१ में 'वायुदूत' सेवा प्रारंभ की गई। जो हवाई अड्डे इंडियन एअरलाइन्स द्वारा नहीं जुड़े थे उन सभी केंद्रों को जोड़ने का कार्य वायुदूत को सौंपा गया है। ऐसी आशा की जाती है कि व्यापरिक तथा पर्यटन केंद्रों को वायुदूत सेवा से विशेष लाभ होगा।

'पवनहंस' सरकारी संस्था द्वारा भारत में हेलीकाप्टर सेवा प्रारंभ की गई है। तेल तथा प्रकृतिक गैस महामंडळ की सहायता के लिए प्रारंभ की गई हेलीकाप्टर सेवा आज आवश्यकतानुसार दुर्गम पर्वतीय प्रदेशों में जाने के लिए उपयोग में लाई जाती है। आजकल वायुमार्गों का उपयोग बहुत बढ़ गया है।

संचार-साधन :

यातायात के साधनों की सुविधा से एक स्थान से दूसरे स्थान तक पहुँचने में कम समय लगता है। किंतु इसकी अपेक्षा संचार माध्यमों द्वारा संसार के दूरस्थ स्थानों से अत्यल्प समय में संपर्क स्थापित किया जा सकता है। इसके कारण संसार बहुत समीप आ गया है। हजारों किलोमीटर स्थित विश्व के कोने में घटती हुई घटना को दूरदर्शन के सहारे आज उसी समय देखा जाता है।

संचार माध्यमों द्वारा लेखन, संभाषण तथा दृश्यात्मक विचारों का आदान-प्रदान होता है। पहले मनुष्य स्वयं संदेश पहुँचाता था। उसके बाद मानव ने तेज गति से चलने वाले पशुओं–घोड़े, ऊँट आदि का उपयोग संदेश वहन के लिए किया। औद्योगिक क्रांति के बाद यह काम विविध स्वचलित यंत्रों द्वारा होने लगा। आज उपग्रह संचार व्यवस्था से इस क्षेत्र में महान क्रांति हुई है।

भारत सदृश विस्तृत देश में पोस्टकार्ड द्वारा देश के किसी भी भाग में सहज संदेश भेजा जाता है। यातायात के साधनों के सामान, संचार-माध्यम भी देश के आर्थिक तथा सामाजिक विकास में महत्वपूर्ण भूमिका निभाते हैं।

संचार माध्यम के प्रकार :

संचार माध्यम के दो मुख्य प्रकार किए जाते हैं (१) व्यक्तिगत संचार माध्यम एवं (२) सार्वजनिक संचार माध्यम।

भारत में व्यक्तिगत संचार माध्यमों में डाक, तार, दूरभाष तथा कृत्रिम उपग्रह प्रमुख साधन हैं। देश में इनके विकास की आधारभूत सुविधाएँ उपलब्ध हैं तथा इनका बड़ा तीव्र गति से विकास हो रहा है।

डाक :

भारत में डाक-तार सेवा प्रारंभ हुए डेढ़ सौ वर्षों से अधिक समय हो गया है। इस अवधि में देश के कोने-कोने में डाक तथा तारघर खोले गए। भारत में डाक तथा तारघर का भौगोलिक वितरण जनसंख्या के वितरण पर निर्भर है। आज ९०% डाकघर ग्रामीण क्षेत्रों में हैं। सामान्यतः भारत में कोई भी गाँव डाकघर से अधिक-से-अधिक ५ किलोमीटर अंतर पर है। पत्र, पार्सल तथा कम समय में तीव्र गति से पहुँचने के लिए स्पीड-पोस्ट की योजना प्रारंभ की गई है।

दूरभाष :

सर्वप्रथम कोलकता में दूरभाष सेवा प्रारंभ की गई थी। स्वतंत्रता के बाद दूरभाष की संख्या में बहुत वृद्धि हुई है। भारत के विस्तृत क्षेत्र को देखते हुए यह संख्या अभी कम है। ग्रामीण क्षेत्रों में यह सेवा कहीं-कहीं उपलब्ध है। आज दूरभाष के साथ टेलेक्स तथा फैक्स आदि साधन भी संदेश वहन का काम करते हैं।

सार्वजनिक संचार माध्यम :

सार्वजनिक संचार माध्यमों द्वारा एक ही समय में लोगों से संपर्क स्थापित किया जाता है। इसके लिए समाचारपत्र, पत्रिकाएँ, आकाशवाणी, दूरदर्शन तथा उपग्रह आदि साधनों का उपयोग किया जाता है। देश की जनशक्ति एक महत्वपूर्ण साधन होती है। उसके सक्रिय सहयोग के बिना देश का विकास संभव नहीं है। सार्वजनिक संचार माध्यमों के द्वारा आर्थिक, सामाजिक सांस्कृतिक तथा राजकीय घटनाओं एवं विकास कार्यक्रमों को लोगों तक पहुँचाकर उनके विचार जानना संभव हुआ है।

आज भारत में आकाशवाणी केंद्रों द्वारा विविध प्रकार के कार्यक्रम ९५% लोगों तक पहुँचाए जाते हैं। यद्यपि दूरदर्शन का प्रारंभ हाल ही में हुआ है तथापि इसका प्रसार बड़ी तेजी से होता दीखता है। आज देश की कुल जनसंख्या के ८५% लोग दूरदर्शन कार्यक्रम देखते हैं।

संचार माध्यमों के क्षेत्र में उपग्रह द्वारा संचार तांत्रिक प्रगति की सर्वोच्च सफलता है। उपग्रह ने संचार माध्यमों में क्रांति पैदा कर दी है। इसके द्वारा देश या विदेश के दूरदर्शन के कार्यक्रम, विश्व स्तर पर किसी भी प्रदेश में घटने वाली घटनाओं को कुछ क्षणों में हम दूरदर्शन पर देख सकते हैं। हमें जानकारी है कि संसदीय तथा विधानसभा चुनाव परिणाम की जानकारी दूरदर्शन पर प्रसारित की जाती है। यह संचार माध्यम में हुई प्रगति है। प्राकृतिक साधन-संपत्ति सर्वेक्षण करने तथा वायु की स्थिति का पूर्वानुमान करने के लिए उपग्रहीय संचार माध्यम का अधिक उपयोग हो रहा है। तिरुवनंतपुरम, बंगलूरू, अहमदाबाद, श्रीहरिकोटा आदि प्रमुख अंतरिक्ष केंद्र हैं।

आजकल संगणकों द्वारा संख्यात्मक तथा गुणात्मक जानकारी संकलित की जा रही है। आवश्यकतानुसार इस जानकारी को कहीं भी पहुँचाया जा सकता है। संगणकों द्वारा रेलवे टिकटों का आरक्षण इसका एक सर्वोत्तम उदाहरण है।

स्वाध्याय

(अ)

१. रिक्त स्थानों में उचित शब्द लिखो :

क. भारत तथा यूरोपीय देशों के जोड़ने वाला ....जलमार्ग है।

ख. गोआ में .... तथा................. नदियाँ आंतरिक जलमार्ग के काम करती हैं ।

ग. संचार माध्यम के .... तथा .... दो प्रकार हैं।

घ. विशाखापटनम .... किनारे पर प्रमुख बंदरगाह है ।

ङ. सड़कों तथा रेलमार्गों पर भार कम करने की दृष्टि से.................मार्गों का विशेष महत्व है ।

२. उचित जोड़ियाँ लगाओ :

'क' समूह (महत्वपूर्ण बंदरगाह)	'ख' समूह (राज्य)
च. कांडला	१. केरल
छ. नया मंगलूर	२. तमिलनाडु
ज. चेन्नई	३. पश्चिम बंगाल
झ. कोलकता	४. कर्नाटक
ग. कोचीन	५. गुजरात
	६. गोआ

३. टिप्पणियाँ लिखो :

(१) आंतरिक जलमार्ग

(२) भारत में वायुमार्ग

(३) संचार माध्यमों का महत्व

(४) पूर्वी तट के बंदरगाह

४. कारण लिखो :

(१) सड़कों तथा रेलमार्गों की तुलना में जलमार्ग कम खर्चीला होता है ।

(२) देश में आंतरिक जलमार्ग बढ़ाना आवश्यक है ।

(३) देश के विकास में संचार माध्यमों का महत्वपूर्ण योगदान है ।

५. भारत की रेखाकृति में निम्नलिखित दर्शाओ तथा यथास्थान उनके नाम लिखो :

(१) कोचीन

(२) कांडला

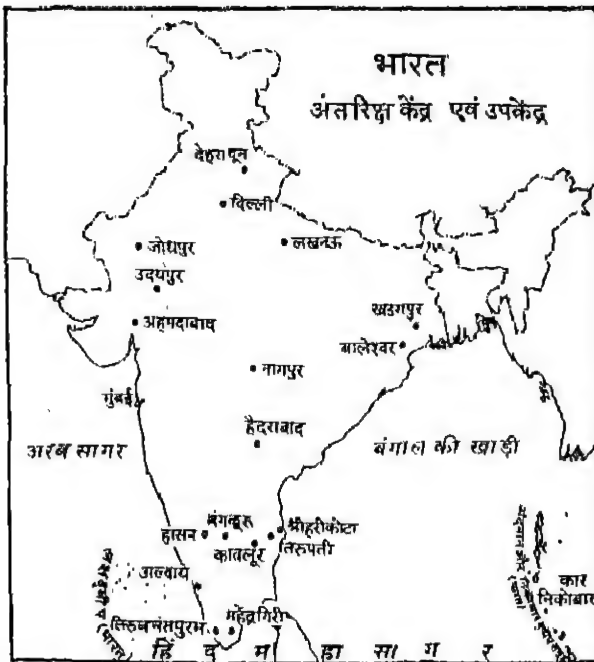
(३) मार्मागोआ

(४) चेन्नई से कोलकता वायुमार्ग

(५) विशाखापटनम

(आ)

किसी बंदरगाह, हवाईअड्डा अथवा संचार माध्यम केंद्र पर जाकर उसकी जानकारी प्राप्त करो और लिखो ।





उपग्रह

प्रकरण १७

व्यापार

वस्तुओं के लेन-देन तथा बेचने-खरीदने को व्यापार कहते हैं। प्राचीनकाल में मानव मात्र अपनी आवश्यकता की पूर्ति के लिए अन्न तथा अन्य वस्तुओं का उत्पादन करता था। अत: स्थानीय वस्तु विनिमय से ही आवश्कता की पूर्ति हो जाती थी। कालांतार से मनुष्य की आवश्यकताओं में वृद्धि हुई। विशिष्ठ प्रदेश में विविध उपभोग्य वस्तुओं का बड़े पैमाने पर उत्पादन होने लगा, जिससे व्यापार में वृद्धि हुई। भौगोलिक परिस्थिति की अनुकूलता तथा उत्पादन व्यय में हुई वृद्धि, ये दोनों घटक उपर्युक्त परिस्थिति निर्माण करने में सहायक हैं। तदुपरांत आवश्यकता वृद्धि के कारण व्यापार प्रारंभ हुआ। पृथ्वी पर स्थान-स्थान पर भौगोलिक विभिन्नता के कारण मनुष्य जहाँ रहता है, वहाँ अपनी आवश्यकता की सभी वस्तुओं का उत्पादन नहीं कर सकता। उस प्रदेश में जिन वस्तुओं के लिए भौगोलिक परिस्थितियाँ अनुकूल होती हैं वहाँ वह उन वस्तुओं का उत्पादन बड़ी मात्रा में करता है और फिर उनको दूसरे प्रदेशों में बेचता है। इसके विपरीत वह जिन वस्तुओं का उत्पादन अपने प्रदेश में नहीं कर सकता या जिनका उत्पादन-व्यय अधिक होता है, उन वस्तुओं को वह दूसरे प्रदेश से खरीदता है। इस प्रकार व्यापार प्रारंभ होता है।

आंतरिक व्यापार :

जो व्यापार देश के अंदर विभिन्न प्रदेशों के बीच हो रहा है वह **'आंतरिक व्यापार'** कहलाता है। भारत क्षेत्रफल की दृष्टि से बहुत बड़ा है। यहाँ किसी राज्य में गेहूँ तो किसी राज्य मे चावल का उत्पादन होता है। किसी राज्य में तेलहन पदार्थ तो किसी राज्य में जूट का उत्पादन होता हैं। एक राज्य में मैंगनीज तो दूसरे में खनिज तेल प्राप्त होता है। अत: देश के विभिन्न राज्यों के बीच व्यापार आवश्यक होता है और इसे ही आंतरिक व्यापार कहा जाता है।

कुछ महत्वपूर्ण राज्यों से दूसरे राज्यों को भेजी जाने वाली वस्तुओं को निम्नलिखित सारिणी में दर्शाया गया है।

सारिणी क्र. १७.१ प्रमुख वस्तुएँ तथा पूर्ति करने वाले राज्य

राज्य	वस्तुएँ
(१) पश्चिम बंगाल	कोयला, जूट, जूटसे बनी वस्तुएँ, लौह-इस्पात, मशीनें, औषधियाँ, कागज, सूती तथा रेशमी वस्त्र, रासायनिक पदार्थ आदि।
(२) झारखंड	कोयला, लौह-इस्पात तथा इससे निर्मित वस्तुएँ, सीमेंट, खनिज पदार्थ आदि।
(३) उत्तर प्रदेश	शक्कर, गुड़, सूती तथा ऊनी वस्त्र, कागज, काँच के सामान, ताले, चमड़े के सामान आदि।
(४) पंजाब	गेहूँ, कपास, चावल, कृषि-यंत्र, मशीनें आदि।
(५) राजस्थान	नमक, जिप्सम, अभ्रक, खनिज तेल, इमारती पत्थर, चमड़ा आदि।
(६) महाराष्ट्र	कपास, ज्वार, शक्कर, रासायनिक वस्तुएँ, सीमेंट, काँच के सामान, मशीनें, मेंगनीज, वस्त्र आदि।
(७) कर्नाटक	चंदन की लकड़ी, सूती तथा रेशमी वस्त्र, मूँगफली का तेल, शक्कर आदि।

भारत का आंतरिक व्यापार अंतर्राष्ट्रीय व्यापार की अपेक्षा कई गुना अधिक है। देश की विशालता के कारण यहाँ की जलवायु, मिट्टी, फसल, खनिज आदि में भी विभिन्नता पाई जा रही है। फलस्वरूप देश के विविध भागों में विविध वस्तुओं का उत्पादन होता है। प्रत्येक राज्य अपनी आवश्यकतानुसार वस्तुओं की माँग दूसरे उत्पादक राज्य से करता है।

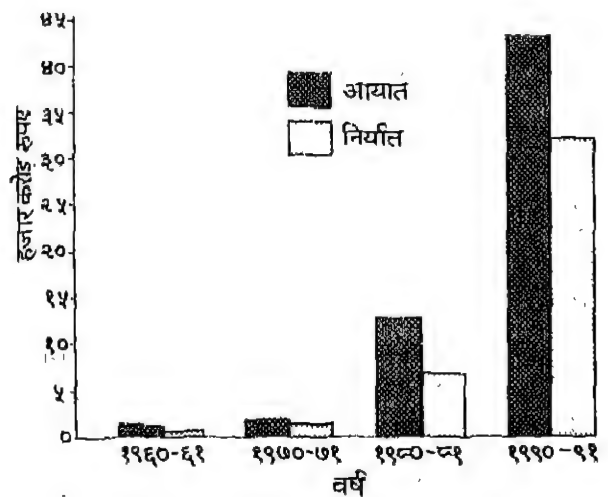
आंतरिक व्यापार द्वारा देश के एक भाग के उत्पादन तथा उद्योग-धंधों का लाभ दूसरे भाग के लिए होता है। विभिन्न राज्यों में विविध उत्पादनों के परिणामस्वरूप विदेशों से आयात में कमी होती है। आंतरिक व्यापार द्वारा देश के विभिन्न प्रदेशों के लोगों में अपनापन तथा एकात्मता की भावना बढ़ती है।

बाह्य व्यापार :

एक देश से दूसरे देश के बीच होने वाला व्यापार 'बाह्य व्यापार' कहलाता है। यह व्यापार राष्ट्रों के बीच होने के कारण इसे **अंतर्राष्ट्रीय व्यापार** कहते हैं। हम अपने देश का माल विदेशों में भेजते हैं, उसे 'निर्यात व्यापार' कहा जाता है। इसके विपरीत विदेशों से माल खरीद कर देश में लाते है तो उसे **'आयात व्यापार'** कहा जाता है।

अंतर्राष्ट्रीय व्यापार की दृष्टि से भारत की स्थिति अनुकूल है। भारत के पूर्व में प्रमुख देश जापान, म्यानमार, इंडोनेशिया, सिंगापुर आदि तथा पश्चिम में विकासशील अफ्रीका के देश हैं। यूरोप तथा उत्तरी अमेरिका के पूर्वी भाग का संसार के पूर्वी देशों से होने वाला व्यापार मुख्यत: स्वेज नहर तथा भारत होकर होता है।

स्वतंत्रता के बाद १९५०-५१ से १९९१-९२ तक भारत का आयात-निर्यात व्यापार मूल्य के अनुसार कैसा रहा है, वह आकृति में दर्शाया है।



आकृति १७.१ भारत का आयात-निर्यात

इस आकृति से यह स्पष्ट होता है कि विगत चालीस वर्षों में देश के आयात-निर्यात में प्रचंड वृद्धि हुई है। देश में निर्यात की अपेक्षा आयात की मात्रा हमेशा अधिक रही है। स्वतंत्रता प्राप्ति के बाद विकास की अनेक नई योजनाएँ कार्यान्वित की गई हैं। इन योजनाओं के लिए मशीनों तथा अन्य साधनों का आयात विदेशों से करना पड़ा। जिससे आयात में वृद्धि हुई।

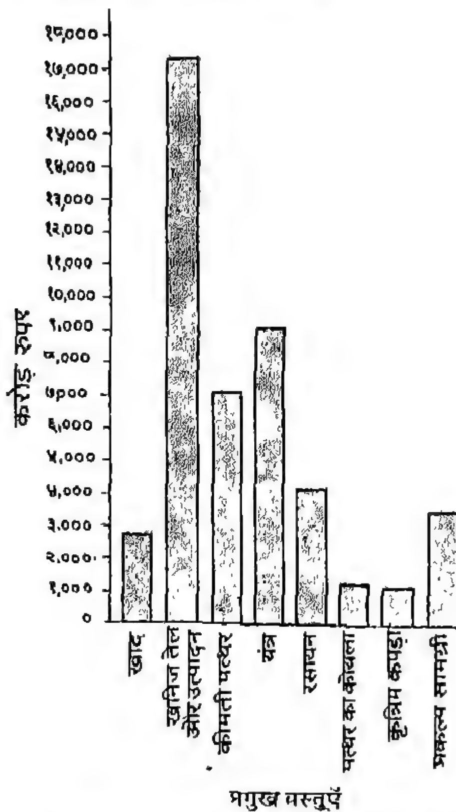
देश की अर्थव्यवस्था को कार्यक्षम रखने के लिए यह आवश्यक है कि आयात तथा निर्यात के कुल मूल्य में अंतर न हो। इसे 'व्यापार संतुलन' कहा जाता है। इस दृष्टि से भारत का व्यापार असंतुलित है।

भारत का आयात-निर्यात :

भारत का संसार के अधिकांश देशों से व्यापारिक संबंध स्थापित है।

आयात :

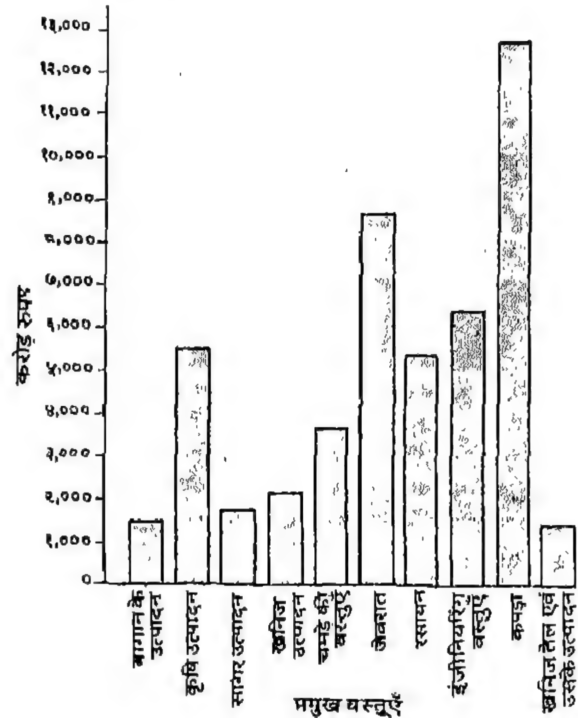
भारत विकासशील देश है, अतः देश में औद्योगिक विकास के लिए अनेक पूँजी रूप वस्तुओं की आवश्यकता होती है। परिणामस्वरुप संपूर्ण आयात का ७५% खनिज मशीनों, खनिज तेल तथा उसके उत्पादन का होता है। इनके अतिरिक्त मोती तथा बहुमूल्य पत्थर, रसायन, रसायनिक खाद, औषधियों तथा कागज का आयात बड़ी मात्रा में होता है।



आकृति १७.२ भारत : आयात (प्रमुख वस्तुएँ)

निर्यात :

स्वतंत्रता प्राप्ति के बाद प्रारंभ में कृषि-उपजों, खनिजों आदि विभिन्न कच्चे मालों का निर्यात होता था। उस समय देश में बहुत कम औद्योगिक विकास हुआ था। आज भारत विविध प्रकार की वस्तुओं की निर्यात करता है। कच्चे माल के स्थान पर आज भारत विभिन्न प्रकार की मशीनें, रसायन, रासायनिक पदार्थ, चमड़ा तथा चमड़े से बनी वस्तुएँ, सूती, ऊनी तथा रेशमी वस्त्र, तैयार कपड़े, हस्तकला की वस्तुएँ, बिजली के पंखे, सिलाई मशीने, डिजेल इंजन, मोटर, रेल के डिब्बे, कृषियंत्र तथा इसी प्रकार के अन्य सामान बड़ी मात्रा में निर्यात करता है। इनके अतिरिक्त खाद्यान्न, कच्चा लोहा, मैंगनीज, बाक्साइट, अभ्रक, ग्रेनाइट, चाय, शक्कर, काफी, रबर, काजू तथा मसालों का पारंपारिक निर्यात भी चालू है।



आकृति १७.३ भारत : निर्यात (प्रमुख वस्तुएँ)

भारत का विदेशी व्यापार मुख्यतः यूरोपीय देशों, संयुक्त राज्य अमेरिका, जापान तथा रूस से होता है। हाल ही में अफ्रीकी देशों से भारत का व्यापार बढ़ा है।

भारत के निर्यात व्यापार में मुख्यतः कृषि उत्पादन, खनिज, वस्त्र, चाय, चमड़ा तथा चमड़े से बनी वस्तुओं आदि का समावेश है। आयातकर्ता देशों को अपने विकास के लिए आवश्यक वस्तुओं का आयात करना होता है।

भारत का व्यापार असंतुलित है। अतः यह देश का औद्योगिक विकास एवं विभिन्न प्रकार की वस्तुओं का उत्पादन बढ़ाकर आयात कम करने का प्रयास भारत कर रहा है।

अंतर्राष्ट्रीय व्यापार की दिशा :

पारस्पारिक हितों को ध्यान में रखते हुए भारत ने अनेक देशों से व्यापारिक संबंध स्थापित किए हैं। विकसित तथा विकासशील दोनों प्रकार के देशों से वस्तुओं का आयात तथा निर्यात होता है।

भारतीय वस्तुओं के लिए संयुक्त राज्य अमेरिका, जापान, रूस, जर्मनी, ग्रेट ब्रिटेन आदि सबसे बड़े बाजार हैं। भारत को वस्तुओं की पूर्ति करने वाले प्रमुख देश जर्मनी, ग्रेट ब्रिटेन, बेल्जियम, जापान, सिंगापुर, सऊदी अरब, रूस, संयुक्त राज्य अमेरिका आदि हैं।

विश्व व्यापार तथा भारत :

प्रादेशिक भौगोलिक विभिन्नता अंतर्राष्ट्रीय व्यापार का मूल

आधार है। संसार का कोई भी देश अपनी आवश्यकता की सभी वस्तुओं का उत्पादन कर आत्मनिर्भर नहीं रह सकता। किसी प्रकार का आर्थिक बंधन डाले बिना आयात तथा निर्यात करने को 'मुक्त व्यापार' कहते हैं परंतु व्यापार सामान्यतः मुक्त नहीं होता। स्वहित की दृष्टि से देश आयात-निर्यत पर बंधन डालते हैं। भारत की 'नियंत्रित व्यापार' नीति है।

अपने देश में अपने उद्योगों के विकास तथा उनको प्रोत्साहित करने के लिए आयातित वस्तुओं पर भारी सीमा शुल्क लगाया जाता है। इसमें देश के उद्योगों को निश्चित रूप से संरक्षण मिलता है। संसार के देशों ने आर्थिक दृष्टि से विचार विमर्श करके व्यापार के गुट स्थापित किए हैं।

विश्व के देशों को परस्पर व्यापारिक संबंध बढ़ाने तथा कुछ सिद्धातों एवं नियमों के पालन के उद्देश्य से संयुक्त राष्ट्र संघ के (यूनो) आर्थिक तथा सामाजिक परिषद ने समझौते का एक प्रस्ताव मान्य किया है। वह 'जनरल एग्रीमेंट ऑन टेरिफ अँड ट्रेड' अर्थात 'गैट' के रूप में जाना जाता है। विभिन्न देशों के बीच व्यापार संबंधी समस्याएँ तथा कठिनाइयों को एक साथ बैठ कर विचार विनिमय द्वारा सुलझाने के लिए 'गैट' उपयुक्त सिद्ध हुआ है। विश्व में ९०% व्यापार 'गैट' के अनुसार होता है। इसी प्रकार विश्व व्यापार संगठन की स्थापना हुई है।

वर्तमान युग विशेषीकरण का युग है। इससे परावलंबन बढ़ा है। इसलिए भारत ने विश्व के अधिकतर देशों के साथ अपना व्यापारिक संबंध स्थापित किया है। निर्यात बढ़ाने के लिए अनेक योजनाएँ हमारे देश में बनाई गई हैं। ऐसा विश्वास किया जाता है कि इससे देश का आर्थिक तथा सामाजिक विकास होगा।

स्वाध्याय

१. रिक्त स्थानों में उचित शब्द लिखो :
   (१) गेहूँ की बड़ी मात्रा में पूर्ति .... राज्य से होती है।
   (२) महाराष्ट्र तथा मिजोराम के बीच के व्यापार को .... कहा जाता है।
   (३) भारत तथा ग्रेट ब्रिटेन के बीच व्यापार............... नहर मार्ग से होता है।

२. उचित जोड़ियाँ लगाओ।

'क' समूह (प्रमुख उत्पादक राज्य)	'ख' समूह (उत्पादन)
(घ) पश्चिम बंगाल	१. जिप्सम
(छ) कर्नाटक	२. चंदन की लकड़ी
(ज) राजस्थान	३. जूट
	४. ताले

३. निम्नांकित प्रश्नों के एक-एक वाक्य में उत्तर लिखो :
   (१) बाह्य व्यापार का क्या अर्थ होता है ?
   (२) व्यापार का संतुलन कैसे होता है ?
   (३) मुक्त बाजार का क्या अर्थ है ?
   (४) एक राज्य से दूसरे राज्य के व्यापार को किस प्रकार का व्यापार कहते हैं ?

३. निम्नांकित प्रश्नों के उत्तर लिखो :
   (१) व्यापार कैसे अस्तित्व में आता है ?
   (२) भारत का व्यापार असंतुलित क्यों है ?
   (३) 'गैट' प्रस्ताव अस्तित्व में क्यों आया ?

* * *

प्रकरण १८

जनसंख्या

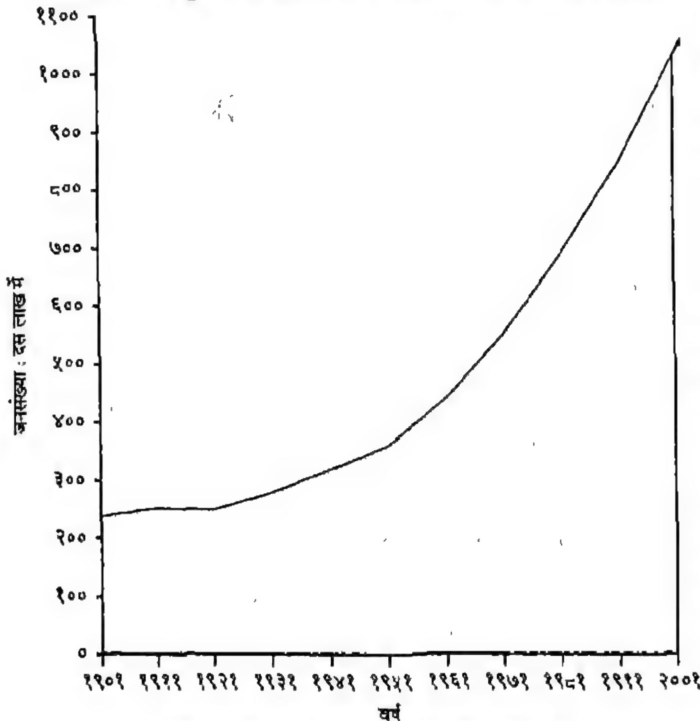
किसी देश का मानव-बल उस देश की प्रगति के लिए प्रेरक शक्ति होता है। मानव-शक्ति के उपयोग से ही विविध प्राकृतिक वस्तुएँ साधन का स्वरूप प्राप्त करती हैं। प्रत्येक देश में लोग विभिन्न व्यवसायों, उत्पादनों, उद्‌योगों, व्यापारों, विविध कलाओं आदि के विकास में लगे रहते हैं। भारत प्राकृतिक संपत्तियों से समृद्‌ध देश है। साथ ही यहाँ विपुल जनशक्ति-संपत्ति है। इस प्रकरण में हम भारत की जनसंख्या, उसका वितरण तथा वैशिष्ट्य आदि का अध्ययन करेंगे।

जनगणना :

देश के सर्वांगीण विकास के लिए प्राकृतिक साधन-संपत्ति की ही भाँति मानव-संपत्ति का भी उपयोग आवश्यक है। इसके लिए देश के विभिन्न भागों में रहने वाले लोगों की संख्या, उनकी आयु, शिक्षा, व्यवसाय आदि का विवरण सरकार के पास रहना चाहिए। इससे देश में संपूर्ण जनसंख्या के लिए पर्याप्त खाद्‌यान्न तथा अन्य वस्तुओं का उत्पादन होता है कि नहीं, यदि नहीं, तो भविष्य में इसके लिए क्या उपाय करने चाहिए आदि की जानकारी सरकार को मिलती है। इसके लिए निश्चित वर्षों में, देश में जनगणना की जाती है । भारत में जनगणना प्रत्येक दस वर्ष में होती है । स्वतंत्र भारत की पहली जनगणना १९५१ में हुई थी, तब से यह नियमित रूप से प्रत्येक दस वर्ष के बाद की जाती है।

जनसंख्या में वृद्‌धि :

२००१ में भारत की जनसंख्या १०२ करोड ७० लाख हुई है। जनसंख्या की दृष्टि से संसार में चीन प्रथम स्थान पर और भारत



आकृति १८.१ भारत की जनसंख्या वृद्‌धि

दूसरे स्थान पर है। संसार की कुल जनसंख्या के १७% लोग हमारे देश में हैं।

आरेख से ज्ञात होता है कि केवल १९२१ की जनगणना के अनुसार जनसंख्या बढने के स्थान पर कम हुई है । इसके बाद यह तेजी से बढती गई है। स्वतंत्रता प्राप्ति के बाद पचास वर्षों में यह बढकर दोगुनी से भी अधिक हो गई है। १९९१ से २००१ के दशक में भारत की जनसंख्या में वृद्‌धि की दर २.१ थी।

सामान्यतः परिस्थितियों की अनुकूलता, खाद्‌यान्न की नियमित पूर्ति तथा प्राकृतिक आपदाओं से मुक्त रहने की स्थिति में जनसंख्या में वृद्‌धि होती है। खाद्‌यान्न की कमी तथा अनियमित पूर्ति, रोग, भूकंप, बाढ, सूखा आदि प्राकृतिक आपदाओं से जनसंख्या में कमी होती है। १९२१ की जनगणना में कमी के ये ही कारण हैं।

जनसंख्या में वृद्‌धि की जानकारी के लिए जन्मदर तथा मृत्युदर की जानकारी प्राप्त की जाती है। पिछले नब्बे वर्षों में जन्मदर में विशेष कमी नहीं हुई लेकिन मृत्युदर में विशेष कमी हुई है। अनेक प्रकार की महामारियों का उन्मूलन, पर्याप्त मात्रा में औषधियों की प्राप्ति, उपचार व्यवस्था में सुधार, रहन-सहन के स्तर में उन्नति आदि के कारण यह कमी हुई है। भारत में बढती हुई जनसंख्या के कारण साधन-संपत्तियों पर बहुत दबाव बढ़ रहा है।

जनसंख्या का भौगोलिक वितरण :

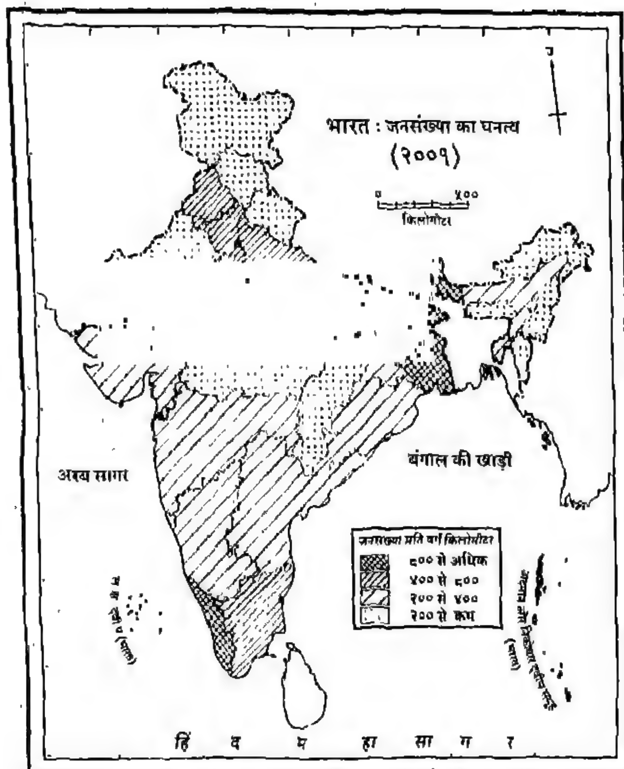
भारत में जनसंख्या का वितरण असमान है। देश के ३३% भूभाग पर ६६% जनसंख्या निवास करती है। इसका अर्थ है कि कुछ भागों में जनसंख्या का केंद्रीकरण हुआ है। कुछ भागों में जनसंख्या बहुत कम है । उत्तर प्रदेश में सबसे अधिक जनसंख्या है। इसके बाद क्रमशः बिहार, महाराष्ट्र, पश्चिम बंगाल, आंध्र प्रदेश राज्य आते हैं। इन पाँच राज्यों में देश की ५०% से अधिक जनसंख्या निवास करती है। सिक्किम, मिजोराम तथा अरूणाचल प्रदेश राज्य में जनसंख्या कम है।

जनसंख्या का घनत्व :

किसी प्रदेश का कुल क्षेत्रफल तथा वहाँ निवास करने वाली कुल जनसंख्या के आधार पर प्रति वर्ग किलोमीटर में रहने वाले लोगों की जनसंख्या ज्ञात की जाती है। इसे ही जनसंख्या का घनत्व कहा जाता है। इसके आधार पर ज्ञात होता है कि किसी प्रदेश की जनसंख्या घनी है अथवा विरल।

सन १९०१ में भारत की जनसंख्या का औसत प्रति वर्ग किमी ७७ था। सन २००१ में बढकर यह ३२४ हो गया है। घनत्व के वितरण में भी बहुत अधिक प्रादेशिक अंतर मिलता है। आज पश्चिम बंगाल सबसे अधिक जनसंख्या के घनत्ववाला राज्य है। उसके बाद क्रमशः केरल, बिहार, उत्तर प्रदेश, तमिलनाडु तथा पंजाब राज्य हैं। सबसे कम जनसंख्या का घनत्व अरूणाचल प्रदेश में है।

केंद्रशासित प्रदेशों में क्षेत्रफल कम होने पर भी जनसंख्या अधिक है। केंद्रशासित प्रदेश दिल्ली का सर्वाधिक जनसंख्या घनत्व ९२९४ प्रति वर्ग किमी. है। भारत की जनसंख्या के मानचित्र में



आकृति १८.२ भारत में जनसंख्या का घनत्व

कुछ स्थानों पर जनसंख्या का घनत्व अधिक है तो कुछ स्थानों पर कम। जनसंख्या के घनत्व के आधार पर भारत को निम्नांकित चार विभागों में बाँटा जा सकता है। इससे जनसंख्या के वितरण की जानकारी मिलती है।

अ. अत्यधिक घनत्व के प्रदेश

दिल्ली, चंडीगढ, लक्षद्वीप, पाँडिच्चेरी, दमण-दीव इन केंद्रशासित प्रदेशों में प्रति वर्ग किमी. घनत्व ८०० से अधिक है।

ब. अधिक घनत्व के क्षेत्र :

इसके अंतर्गत उत्तरप्रदेश, हरियाणा, तमिलनाडु, पंजाब और केंद्रशासित प्रदेश दादरा-नगर हवेली राज्य आते हैं। इस समूह का जनसंख्या घनत्व ४०० से ८०० वर्ग किमी. तक है। दक्षिण भारत के तमिलनाडु राज्य को छोडकर शेष सभी राज्य गंगा के उपजाऊ मैदान मे स्थित हैं।

क. मध्यम घनत्व के प्रदेश :

इन प्रदेशों का घनत्व २०० से ४०० तक है। इनमें हरियाणा, गोआ, असम, त्रिपुरा, महाराष्ट्र, आंध्र प्रदेश, कर्नाटक, गुजरात, उड़ीसा तथा झारखंड राज्य हैं।

ड. विरल घनत्व के प्रदेश :

इसमें मध्यप्रदेश, छत्तीसगढ़, राजस्थान, जम्मू-कश्मीर, हिमाचल प्रदेश, उत्तरांचल, पूर्वोत्तरी राज्यों तथा केंद्रशासित प्रदेश अंदमान-निकोबार द्वीप समुह का समावेश होता है। इन राज्यों में जनसंख्या घनत्व प्रति वर्ग किमी. २०० से कम है।

जनसंख्या की प्रमुख विशेषताएँ :

वय स्वरूप : २००१ की जनगणना के अनुसार देश की ३५% जनसंख्या ० से १४ वर्ष की उम्रवाले समूह में, ७% जनसंख्या ६० वर्ष से अधिक उम्रवाले समूह में, ५८% जनसंख्या १५ से ६० वर्ष उम्रवाले समूह में है। देश में १५ वर्ष तक की उम्रवाली तथा ६० वर्ष से अधिक उम्रवाली जनसंख्या परावलंबी जनसंख्या समझी जाती है। इस जनसंख्या के पालन-पोषण की जिम्मेदारी १५ से ६० वर्ष की उम्रवाली कार्यकुशल जनसंख्या पर होती है। २००१ की जनगणना के आधार पर भारत में कार्यकुशल जनसंख्या अधिक होने के कारण ऐसा कहा जा रहा है कि देश विकास की ओर अग्रसर है।

लिंग अनुपात :

पुरुष तथा नारी की संख्या के अनुपात को लिंग अनुपात कहा जाता है। लिंग अनुपात के आकलन प्रति १००० पुरुषों की संख्या पर स्त्रियों की संख्या का आधार लेकर किया जाता है। २००१ की जनगणना के अनुसार भारत में प्रति एक हजार पुरुष पर ९३३ स्त्रियाँ थीं। सामान्यतः भारतीय जनसंख्या में स्त्रियों की संख्या कम होने के लक्षण दिखाई दे रहे हैं। भारत में केवल केरल राज्य में पुरुषों की अपेक्षा स्त्रियों की संख्या अधिक है तो हरियाणा राज्य में सबसे कम है।

ग्रामीण-नागरी अनुपात :

भारत में लगभग ७२% लोग गाँवों में रहते हैं। देश के कोने-कोने में फैले छोटे-बडे गाँवों में लोग निवास करते हैं। अतः ऐसा कहा जाता है कि भारत का विकास का अर्थ है गाँवों तथा उनमें रहने वाले लोगों का विकास। स्वतंत्रता प्राप्ति के बाद विशेषतः पिछले २० वर्षों में लोग गाँवों से नगरों की ओर जाने लगे हैं।

१९९१ की तुलना में २००१ में नागरी जनसंख्या में २% की वृद्धि हुई है। उस समय भारत में दस लाख से अधिक जनसंख्या वाले २५ नगर थे। भारत में मुंबई सबसे अधिक जनसंख्या वाला शहर है। दिल्ली, कोलकता, चेन्नई, हैदराबाद, बंगलूर, अहमदाबाद, पुणे आदि २० लाख से अधिक जनसंख्यावाले शहर हैं। नवीन उद्योग-धंधों की वृद्धि, विविध व्यवसायों की वृद्धि, नौकरी की उपलब्धता तथा शहरी जीवन के आकर्षण के कारण लोग शहरों की ओर आकर्षित हो रहे हैं।

साक्षरता :

जनसंख्या शिक्षित होने पर देश का आर्थिक तथा सांस्कृतिक विकास तेजी से होता है। शिक्षा द्वारा मनुष्य नए विचार समझता है तथा विचार करने लगता है। नए व्यवसाय में काम करने के लिए शिक्षा आवश्यक है। स्वतंत्रता प्राप्ति के बाद सरकार साक्षरता बढ़ाने के लिए सतत प्रयासरत है। देश में साक्षरता धीरे-धीरे बढ़ रही है। स्त्रियों की अपेक्षा पुरुष अधिक साक्षर हैं। आज भारत में कुल जनसंख्या के ६५% लोग साक्षर हैं।

देश में सबसे अधिक साक्षरता ९१% केरल राज्य में है। मिजोराम, गोआ, महाराष्ट्र, पंजाब एवं चंडीगढ़, लक्षद्वीप, दिल्ली, पाँडिच्चेरी, दमण-दीव, अंदमान-निकोबार इन केंद्रशासित प्रदेशों में साक्षरता ७५% से अधिक है। बिहार राज्य में साक्षरता का प्रमाण सबसे कम है। वह केवल ४७% है।

जनसंख्या एक साधन संपत्ति :

भूतकाल में आर्थिक कार्य और देश की सुरक्षा के लिए अधिक जनसंख्या एक आवश्यकता समझी जाती थी। दैनिक आवश्यकताओं की पूर्ति करने के लिए काम करने, देश रक्षा के लिए युद्ध करने, अपने समूह की सुरक्षा करने तथा अनेक कामों के लिए अधिक लोगों की आवश्यकता होती थी। बाद में मशीनों के आगमन से तुलनात्मक दृष्टि से मानव श्रम की कम आवश्यकता होने लगी। इसी काल में भारत तथा विश्व की जनसंख्या में बहुत वृद्धि हुई। परिणामस्वरूप प्राकृतिक साधन-संपत्ति पर भारी दबाव

बढने लगा। जनसंख्या वृद्धि की गति की अपेक्षा खाद्यान्न तथा अन्य आवश्यक वस्तुओं के उत्पादन की गति धीमी थी। जिससे लोगों के रहन-सहन के स्तर में वृद्धि नहीं हुई। अतः यह धारणा पैदा होना संभव है कि अधिक जनसंख्या विकास के मार्ग में बाधक होती है। मनुष्य प्राकृतिक पर्यावरण तथा वस्तुओं का उपयोग जब तक नहीं करता तब तक उसे साधन-संपत्ति नहीं कहा जा सकता। यदि देश में प्राकृतिक पर्यावरण है किंतु लोग क्रियाशील नहीं हैं, तो देश का विकास संभव नहीं होता।

साधन-संपत्ति बनने के लिए जनसंख्या को अधिक गुणवान होना चाहिए। इस जनसंख्या में से काम करने वाले समूह का प्रतिशत अधिक होना चाहिए। शिक्षा से विचार करने की शक्ति बढती है अतः सभी लोगों को शिक्षित होना चाहिए। प्रकृति ने मनुष्य को बुद्धिमत्ता, कल्पनाशीलता, महत्वाकांक्षा, निर्णय लेने की क्षमता आदि गुण दिए हैं। इन गुणों का विकास शिक्षा द्वारा होता है। भारत सरकार ने मानव साधन-संपत्ति के विकास के लिए प्रयास प्रारंभ कर दिया है। इन प्रयासों में शिक्षा-व्यवस्था तथा व्यक्तित्व का विकास सम्मिलित है। यदि भारत में मानव साधन-संपत्ति का उचित उपयोग होने लगे और जन्मदर नियंत्रित हो जाए तो जनसंख्या हमारी समस्या नहीं रहेगी, बल्कि देश के विकास के लिए मौलिक साधन बनेगी।

विशेष - इस प्रकरण में जनसंख्या की जानकारी 'भारतीय जनगणना २००१' के प्राथमिक प्रतिवेदन के अनुसार दी गई है।

स्वाध्याय

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१. (अ) रिक्त स्थानों में उचित शब्द लिखो :
(१) भारत में जनगणना प्रति .... वर्ष में की जाती है।
(२) भारत में सबसे अधिक जनसंख्या वाला राज्य ...... है।
(३) भारत में .... राज्य कम घनता वाला राज्य है।
(४) जनसंख्या की दृष्टि से विश्व में भारत का .... स्थान है।
(५) भारत में .... राज्य में पुरुषों की अपेक्षा स्त्रियों की संख्या अधिक है।

२. निम्नांकित को स्पष्ट करो :
(१) आयु-स्वरूप
(२) लिंग-अनुपात
(३) जनसंख्या का घनत्व
(४) जनगणना

३. टिप्पणियाँ लिखो :
(१) भारत में जनसंख्या का घनत्व
(२) भारत में जनसंख्या की वृद्धि

४. कारण लिखो :
(१) जनसंख्या देश की प्रगति के लिए एक प्रेरक शक्ति है।
(२) राजस्थान में जनसंख्या का घनत्व कम है।

५. निम्नांकित प्रश्नों के उत्तर लिखो :
(१) भारत में जनसंख्या के भौगोलिक वितरण की जानकारी लिखो।
(२) भारत में जनसंख्या का वितरण असमान क्यों है?
(३) जनसंख्या एक साधन-संपत्ति है, स्पष्ट करो।

६. भारत के मानचित्र में निम्नांकित बातों को दर्शाते हुए यथास्थान उनके नाम लिखो :
(१) सर्वाधिक जनसंख्या वाले राज्य।
(२) भारत में सबसे अधिक नागरी जनसंख्यावाला शहर।
(३) २० लाख से अधिक जनसंख्यावाला दक्षिण भारत का कोई एक शहर।
(४) अधिक जनसंख्या-घनत्ववाला केंद्रशासित राज्य।
(५) सबसे अधिक साक्षर राज्य।

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अपने गाँव की जनसंख्या की जानकारी निम्नांकित बातों के आधार पर लिखो।
(१) कुल जनसंख्या,
(२) स्त्री और पुरुष की संख्या,
(३) जनसंख्या का घनत्व,
(४) साक्षरता की मात्रा।

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प्रकरण १९

क्षेत्र अध्ययन तथा विवरण लेखन

भूगोल एक विज्ञान है। भूगोल के अध्ययनकर्ता के लिए पृथ्वी प्रयोगशाला है। वह पृथ्वी पर प्राकृतिक तथा मानवीय घटनाओं का विश्लेषण करते हुए उनमें व्याप्त अंतर्क्रियाओं का अध्ययन करता है। वास्तविक अध्ययन के बिना बहुत-से प्राकृतिक तथा मानवीय उद्‌देश्य स्पष्ट नहीं होते हैं। पुस्तकों में पढ़े हुए सिद्‌धांतों की अपेक्षा हम पृथ्वी के छोटे-से भूभाग का नमूने के रूप में अध्ययन करके पुस्तकों में दिए तत्व भली-भाँति समझ सकते हैं।

भूगोल निरीक्षण द्‌वारा अध्ययन किया जाने वाला विज्ञान है। यद्यपि संपूर्ण पृथ्वी का निरीक्षण द्‌वारा अध्ययन संभव नहीं है, अतः हम अपने परिसर में कुछ भौगोलिक तत्वों का अध्ययन प्रत्यक्ष भेंट देकर कर सकते हैं। बाँध क्षेत्र, विद्‌युत प्रकल्प-स्थल, कारखानों तथा बाजारों में जाकर जानकारी एकत्र की जा सकती है। इस प्रकार के अध्ययन को **क्षेत्र-अध्ययन** अथवा **प्रकल्प अध्ययन** कहा जा सकता है। इस प्रकरण में हम पढ़ेंगे कि क्षेत्र-अध्ययन की तैयारी कैसे की जाती है तथा किसी विशिष्ट क्षेत्र का अध्ययन करते समय किन-किन मुद्‌दों पर विचार किया जाता है। हम यह जानने का भी प्रयास करेंगे कि प्राप्त जानकारी के आधार पर कैसे भौगोलिक विवरण तैयार किया जाता है।

पूर्व तैयारी :

भौगोलिक क्षेत्र का निरीक्षण करने से पूर्व हमें उसका उद्‌देश्य जानना आवश्यक होता है। हमें यह विचार करना चाहिए कि अपेक्षित उद्‌देश्य की प्राप्ति के लिए हमें संबंधित परिसर में किन-किन भौगोलिक तत्वों को देखना है। अतः जिस प्रदेश में जाना है उसका शिक्षक की सहायता से रेखाचित्र तैयार कर लेना चाहिए। इससे यह जानकारी हो जाती है कि चुने हुए परिसर में जाने के लिए रास्ता कौन-सा है? परिसर कितना दूर है ? वहाँ जाने के लिए यातायात का कौन-सा साधन उपलब्ध है, तथा पहुँचने में कितना समय लगता है।

सर्वेक्षण पर जाते समय हमें अपने साथ क्षेत्र परिचय-पुस्तिका (मानचित्र), कलम, पेन्सिल, नाप-जोख करने के लिए स्केल तथा टेप, दिशा निश्चित करने के लिए दिक्‌सूचक यंत्र आदि रखना चाहिए। परिसर के भूरूपों तथा सांस्कृतिक स्वरूपों का छायाचित्र लेने के लिए एक कैमरा भी साथ में रखना चाहिए। अध्ययन के उद्‌देश्य के अनुसार तैयार की हुई प्रश्नावली को हमें अवश्य साथ रखना चाहिए।

प्रश्नों के उत्तर साक्षात्कार तथा निरीक्षण के आधार पर लिखे जाते हैं। इसके लिए आवश्यक है कि पहले ही प्रश्नों के अर्थ तथा उद्‌देश्य ठीक ढंग से, भली-भाँति समझ लिए जाएँ। यदि हम परिसर में सावधानीपूर्वक सचेत होकर भौगोलिक सर्वेक्षण संबंधी प्रारूप बना लेंगे, तो विवरण तैयार करने में सरलता होगी।

क्षेत्र-अध्ययन के लिए स्थल का चुनाव :

जिन सिद्‌धांतों तथा तत्वों का अध्ययन हम भूगोल की पुस्तक में करते हैं, क्षेत्र-अध्ययन से उनकी जाँच-पड़ताल हो जाती है। इन जानकारियों का उचित उपयोग क्षेत्र-अध्ययन में सहभागी होने पर ही अवलंबित है।

निम्नांकित में से किसी एक का चुनाव क्षेत्र-अध्ययन के लिए किया जा सकता है–

(१) नदी तथा नदी किनारे का प्रदेश
(२) सिंचाई प्रकल्प
(३) वन परिसर
(४) गाँव अथवा शहर का बाजार
(५) आदियासी लोगों का क्षेत्र

इस प्रकरण के अंत में सूचनाएँ एकत्र करने के लिए आदर्श प्रश्नों की तालिका मार्गदर्शन के रूप में दी गई है। चुने हुए क्षेत्र के लिए उचित सूची का उपयोग करते हुए विवरण तैयार किया जाए।

विवरण लेखन :

निरीक्षण तथा साक्षात्कार द्‌वारा जानकारी प्राप्त करने के उपरांत विवरण लिखा जाता है। प्राप्त जानकारियों का संकलन करते हुए तालिका, मानचित्र, रेखाचित्र, फोटो आदि के उपयोग का विवरण लिखा जाता है।

निम्नांकित बातों पर ध्यान देते हुए विवरण लिखा जाता है।

(१) प्रस्तावना :

अध्ययन के लिए चुने गए परिसर का महत्व बताते हुए यह बताइए कि परिसर, गाँव या विद्‌यालय से कितना दूर है। वहाँ जाने के लिए कच्चा रास्ता है कि पक्का? किस प्रकार के साधन द्‌वारा वहाँ पहुँचा जाता है। वहाँ पहुँचने में कितना समय लगता है। यह भी लिखिए कि किस उद्‌देश्य से इस क्षेत्र का अध्ययन करना निश्चित किया गया है।

(२) स्थान :

चुने हुए स्थान का पहले अपने गाँव के संदर्भ में स्थिति तथा दिशा-निर्देश किया जाता है। इसके बाद यह बताया जाता है कि यह किस पर्वत पर, पर्वत तलहटी में, वन सीमा पर अथवा नदी किनारे है। अक्षांश तथा देशांतररेखा पर स्थान बता सके तो अच्छा ही होगा। उस क्षेत्र का स्थान-दर्शक रेखाचित्र (Sketch) बनाया जा सकता है।

(३) प्राकृतिक स्वरूप :

परिसर के धरातल की पहाड़ियाँ, टीले, ढलानवाले निचले क्षेत्र तथा मैदानी क्षेत्र और ऊँचाई का वर्णन करना चाहिए। यदि

नदी तथा उसकी उपनदी हो तो उसकी प्रवाह की दिशा ढलान का वर्णन किया जाए।

(४) जलवायु :

परिसर के बड़े गाँव अथवा तहसील के स्थान पर तापमान तथा वर्षा की जानकारी मिल सकती है। इसके आधार पर परिसर के तापमान तथा वर्षा का वर्णन किया जाता है। अन्यथा भूपृष्ठ पर उपलब्ध जल की मात्रा, घने तथा विरल वनस्पति के प्रकार, घर तथा उनकी छतों आदि के आधार पर जलवायु का वर्णन किया जाता है।

(५) भूमि–उपयोग :

चुने हुए परिसर में भूमि का उपयोग किन-किन कामों के लिए किया जाता है, इसे लिखा जाता है। उदाहरणस्वरूप बस्ती, वन, कृषि, चरागाह, खदान आदि के लिए।

(६) जनसंख्या :

चुने हुए परिसर की कुल जनसंख्या, वय स्वरूप, लिंग-भेद, साक्षरता की मात्रा, आर्थिक व्यवसाय, मानव बस्ती तथा अन्य सेवाओं आदि का वर्णन किया जाता है।

(७) निष्कर्ष :

यह लिखा जाता है कि इस परिसर के अध्ययन से हमने क्या सीखा, किस प्रकार का हमारा भौगोलिक विचार बना।

मार्गदर्शक प्रश्न :

१. नदी घाटी प्रदेश का अध्ययन

भारतीय संस्कृति में नदियों का विशेष महत्व है। प्राचीन काल से ही संस्कृति का विकास नदियों की घाटियों में हुआ है। भारत के अधिकांश नगर तथा गाँव नदियों के किनारे बसे हैं। तराई में उपलब्ध उपजाऊ मिट्टी के कारण खेती का विकास हुआ है। इसलिए मानव बस्ती तथा कृषि के विकास में नदी के योगदान का अध्ययन के लिए नदी घाटी के प्रदेश को चुन सकते हैं। इसका अध्ययन निम्नलिखित मुद्दों के आधार पर किया जा सकता है–

(१) नदी का नाम क्या है ?
(२) नदी का उद्गम स्थान कहाँ है ?
(३) नदी प्रवाह की दिशा कौन-सी है ?
(४) क्या प्रमुख नदी/सहायक नदी है ?
(५) मुख्य नदी है तो किस सागर से मिलती है ?
(६) सहायक नदी है तो किस नदी से मिलती है ?
(७) क्या नदी का तल उथला/गहरा है।
(८) नदी तल में निक्षेपण के पदार्थ कौन-से हैं ?
(९) क्या नदी तल में जल सामयिक/वर्षभर है ?
(१०) नदी किनारे कौन-से गाँव हैं ?
(११) ये गाँव नदी के किस किनारे पर स्थित हैं तथा क्यों ?
(१२) गाँव में जलपूर्ति की क्या व्यवस्था है ?
(१३) क्या नदी पर बाँध बनाया गया है ? हाँ, तो वह कहाँ पर है ? इस बाँध का उस परिसर में सिंचाई के लिए किस प्रकार उपयोग किया जाता है ?
(१४) इस प्रदेश की मिट्टी किस प्रकार की है?
(१५) नदी के कछार में कौन-कौन-सी फसलें उगाई जाती हैं ?
(१६) इस प्रदेश में घर बनाने के लिए किन वस्तुओं का उपयोग किया जाता है ?

२. सिंचाई प्रकल्प अवलोकन

अपने देश को मानसून हवाओं से अनियमित वर्षा प्राप्त होती है। वर्षा के असमान वितरण के कारण खेती के लिए आवश्यक मात्रा में पानी उपलब्ध नहीं होता। खेती के लिए उपयुक्त मात्रा में पानी-पूर्ति के लिए प्रकल्प बनाए गए हैं। किसी एक प्रकल्प पर जाकर निम्नांकित प्रश्नों के आधार पर निरीक्षण तैयार करना सरल है।

(१) सिंचाई प्रकल्प का नाम क्या है ?
(२) आपके गाँव से इस प्रकल्प की कितनी दूरी है ?
(३) वहाँ जाने के लिए परिवहन का कौन-सा मार्ग है ?
(४) प्रकल्प किस नदी पर है?
(५) प्रकल्प की प्राकृतिक विशेषता कौन-सी है ?
(६) इस प्रकल्प के जलाशय की क्षमता, बाँध की लंबाई, ऊँचाई कितनी है ?
(७) किस वर्ष से यह प्रकल्प कार्यान्वित हुआ है ?
(८) इस प्रकल्प द्वारा कितने सिंचित क्षेत्र हैं ?
(९) किन-किन जिलों को इससे जलपूर्ति होती है?
(१०) इस सिंचाई क्षेत्र में कौन-कौन-सी फसलें पैदा की जाती हैं ?
(११) सिंचाई के अतिरिक्त इसके अन्य कौन-से उद्देश्य हैं ?
(१२) इस प्रकल्प के परिसर में कौन-कौन-से उद्योग स्थापित हैं ?
(१३) इसके अध्ययन द्वारा किन भौगोलिक बातों की जानकारी प्राप्त होती है?

३. वन प्रदेश का अवलोकन

हमें ज्ञात है कि मिट्टी आदि भौगोलिक तत्वों का प्रभाव वनस्पति के विकास पर पड़ता है। सघन वनों के क्षेत्र का अध्ययन करने से हमें वनों के विषय में जानकारी मिलती है। यहाँ के वृक्षों के प्रकार, उनके पत्ते-फूल, लताएँ, घास, पशुओं आदि की जानकारी मिलती है। वनों के अध्ययन से हमें उनका महत्व ज्ञात होता है। निम्नांकित मुद्दों पर विचार करते हुए वन प्रदेश का अवलोकन करो :

(१) वन का नाम क्या है ?
(२) यह वन तुम्हारे गाँव से कितनी दूर तथा किस दिशा में है ?
(३) यह वन किस प्रकार का है ?
(४) वन प्रदेश की प्राकृतिक रचना कैसी है ?
(५) वन की मिट्टी किस रंग की है ?
(६) वन में वृक्षों की औसत ऊँचाई कितनी है ?
(७) वृक्षों के पत्ते कैसे हैं ?

(८) वन से किन-किन वस्तुओं को इकट्ठा करते हैं ? उनके नाम तथा उपयोग लिखो ।

(९) वनों से एकत्रित वस्तुएँ बाहर कहाँ भेजी जाती हैं ?

(१०) अत्यधिक कटाई से रक्षा के लिए क्या कोई योजना बनाई गई है? है, तो कौन-सी ?

(११) क्या वनों में आदिवासी बस्ती है ? है, तो कहाँ ?

४. गाँव/शहर, बाजार की भेंट

हम सामान्यतः गाँव के साप्ताहिक तथा शहरों के दैनिक बाजार से परिचित हैं। हमें इन बातों की पूर्ण जानकारी नहीं है कि इस बाजार में वस्तुएँ कहाँ से, कितनी मात्रा में, कितने प्रकार की आती हैं ? बाजार में इसकी माँग कितनी तथा ग्राहक कितने हैं ? लेन-देन कैसे होता है ? मानव की आर्थिक क्रियाओं में व्यापार एक महत्वपूर्ण क्रिया है। इसका अध्ययन करने के लिए निम्न बातों का सहारा लिया जा सकता है :

(१) बाजार स्थान गाँव/शहर का नाम क्या है ?

(२) गाँव का दैनिक बाजार सप्ताह में किस दिन भरता है ?

(३) गाँव का स्थान कैसा है ?

(४) गाँव/शहर में पहुँचने के मार्ग कैसे हैं ?

(५) बाजार में जाने के लिए कौन-कौन से वाहन उपलब्ध हैं ?

(६) बाजार की व्यवस्था करने वाली कौन-सी संस्था है ?

(७) बाजार में प्रमुख वस्तुएँ कौन-सी हैं?

(८) बाजार की दूकानों की स्थिति और सजावट कैसी है ?

(९) इस गाँव/शहर के परिसर से कौन-सी वस्तुएँ बाजार में आती हैं ?

(१०) कौन-से माल सुदूर शहरों/कारखानों से आते हैं और कितनी दूरी से ?

(११) किन वस्तुओं की खरीदी के लिए ग्राहकों की भीड़ होती है ?

(१२) बाजार में किन-किन गाँवों के लोग आते हैं ?

(१३) बाजार में कौन-सी सुविधाएँ उपलब्ध हैं ?

(१४) इस अध्ययन से किस भौगोलिक तत्व के कार्य की जानकारी प्राप्त होती है ?

५. आदिवासी क्षेत्रों का अध्ययन

भारत की दुर्गम पहाड़ी तथा पर्वतीय क्षेत्रों में अथवा वनों में आदिवासी लोग रहते हैं। समयानुसार विचारों के आदान-प्रदान से इनके जीवन पद्धति में परिवर्तन आया है। अब इनके जीवन पर भौगोलिक तत्वों का प्रभाव दिखाई देने लगता है । यह प्रभाव जानने के लिए पहले यह जानना आवश्यक है कि ये अपनी प्राथमिक आवश्यकताओं की पूर्ति कैसे करते हैं ? इसके बाद हम इनके सामाजिक तथा सांस्कृतिक जीवन की जानकारी प्राप्त करेंगे।

उपर्युक्त बातों की जानकारी प्राप्त करने के लिए हम निम्नांकित बातों का सहारा ले सकते हैं..................

(१) आदिवासी गाँव/वाड़ा/पाड़ा का नाम क्या है ?

(२) आदिवासी जमात का नाम क्या है ?

(३) इस गाँव की अपने गाँव से कितनी दूरी है ?

(४) क्या गाँव जाने के लिए सड़क है ?

(५) वह किस प्रकार की है ?

(६) आदिवासी गाँव का स्थान कहाँ है ?

(७) इस स्थान पर सरलता से पहुँचा जा सकता है या पहुँचने में दुर्गम है ?

(८) इसकी कुल जनसंख्या कितनी है ? गाँव में कितने घर झोपड़ियाँ हैं ?

(९) इस गाँव में कौन-सी सुविधाएँ हैं?

(१०) लोगों के आहार में कौन-से पदार्थ होते हैं ?

(११) पहनावे का प्रकार कैसा है ?

(१२) स्त्रियाँ कौन-से गहने पहनती हैं ?

(१३) उनके घर कैसे हैं ?

(१४) लोगों के व्यवसाय कौन-कौन-से हैं ?

स्वाध्याय

(अ)

१. निम्नांकित प्रश्नों के उत्तर संक्षेप में लिखो :

(१) क्षेत्र अध्ययन का अर्थ क्या है ?

(२) भौगोलिक निरीक्षण के पूर्व किन-किन मुद्दों पर विचार किया जाता है? उनके क्या लाभ हैं ?

(३) सर्वेक्षण के लिए किन-किन वस्तुओं की आवश्यकता होती है ?

(४) क्षेत्र-अध्ययन की क्या आवश्यकता है ?

(५) विवरण लेखन करते हुए किन-किन बातों पर विचार करना पड़ता है ?

(६) विवरण-लेखन की प्रस्तावना कैसे लिखी जाती है ? स्पष्ट करो.

(७) विवरण-लेखन में जलवायु की जानकारी क्यों महत्वपूर्ण है ?

(८) देखे गए किसी एक स्थल/प्रदेश का विवरण लिखो ।

(अ) नदी तथा उसके तटीय प्रदेश

(ब) सिंचन प्रकल्प

(क) वन परिसर

(ड) आदिवासी जाति के क्षेत्र

(इ) गाँव अथवा शहर के बाजार ।

* * *

पारीशिष्ट
राज्य तथा केंद्रशासित प्रदेश

क्र.	राज्य	क्षेत्रफल वर्ग किमी.	जनसंख्या २००१	घनत्व वर्ग किमी.	राजधानी
१	२	३	४	५	६
१.	आंध्र प्रदेश	२७५०६८	७५७२७५४१	२७५	हैदराबाद
२.	अरूणाचल प्रदेश	८३७४३	१०९१११७	१३	इटानगर
३.	असम	७८४३८	२६६३८४०७	३४०	दिसपुर
४.	विहार	९४१६३	८२८७८७९६	८८०	पटना
५.	छत्तीसगढ़	१३५१९४	२०७९५९५६	१५४	रायपुर
६.	गोवा	३७०२	१३४३९९८	३६३	पणजी
७.	गुजरात	१९६०२४	५०५९६९९२	२५८	गांधीनगर
८.	हरियाणा	४४२१२	२१०८२९८९	४७७	चंडीगढ़
९.	हिमाचल प्रदेश	५५६७३	६०७७२४८	१०९	शिमला
१०.	जम्मू और कश्मीर	२२२२३६	१००६९९१७	९९	श्रीनगर (ग्रीष्म) जम्मू (शीत)
११.	झारखंड	७९७१४	२६९०९४२८	३३८	रांची
१२.	कर्नाटक	१९१७९१	५२७३३९५८	२७५	बंगलूरु
१३.	केरल	३८८६३	३१८३८६१९	८१९	तिरूवनंतपूरम
१४.	मध्य प्रदेश	३०८२५२	६०३८५११८	१९६	भोपाल
१५.	महाराष्ट्र	३०७७१३	९६७५२२४७	३१४	मुंबई
१६.	मणिपुर	२२३२७	२३८८६३४	१०७	इंफाल
१७.	मेघालय	२२४२९	२३०६०६९	१०३	शिलाँग
१८.	मिजोराम	२१०८१	८९१०५८	४२	एर्जोल
१९.	नागालैंड	१६५७९	१९८८६३६	१२०	कोहिमा
२०.	उडीसा	१५५७०७	३६७०६९२०	२३६	भुबनेश्वर
२१.	पंजाब	५०३६२	२४२८९२९६	४८२	चंडीगढ़
२२.	राजस्थान	३४२२३९	५६४७३१२२	१६५	जयपुर
२३.	सिक्किम	७०९६	५४०४९३	७६	गंगटोक
२४.	तमिलनाडु	१३००५८	६२११०८३९	४७८	चेन्नई
२५.	त्रिपुरा	१०४९२	३१९११६८	३०४	आगरताला
२६.	उत्तर प्रदेश	२३८५६६	१६६०५२८५९	६८९	लखनऊ
२७.	उत्तरांचल	५५८४५	८४७९५६२	१५९	देहरादून
२८.	पश्चिम बंगाल	८८७५२	८०२२११७१	९०४	कोलकता
संघराज्य क्षेत्र					
१.	अंदमान, निकोबार द्वीप	८२४९	३५६२६५	४३	पोर्ट ब्लेअर
२.	चंडीगढ़	११४	९००९१४	७९०३	चंडीगढ़
३.	दादरा-नगर-हवेली	४९१	२२०४५१	४४९	सिल्वासा
४.	दमण व दीव	११२	१५८०५९	१४११	दमण
५.	दिल्ली	१४८३	१३७८२९७६	९२९४	दिल्ली
६.	लक्षद्वीप	३२	६०५९५	१८९४	कवरत्ती
७.	पांडिच्चेरि	४९२	९७३८२९	२०२९	पांडिच्चेरि
भारत		३२८७२६३	१०२७०१५२४७	३२४	दिल्ली

पारिभाषिक शब्दावली

[illegible] फसलें	Non food crops	केंद्रीयता	Concentration
[illegible] लैंड	Angara land	सूखा अकाल	Dry spell
[illegible] चट्टान	Imperious rock	कृत्रिम बंदरगाह	Artificial Port
[illegible] खनिज	Non-merallic minerals	भ्रंश घाटी	Rift valley
[illegible] मच्छीमारी	Inland fishing	खादर	Khadar
[illegible] व्यापार	Internal trade	खरीफ	Kharip
[illegible]रिक ऊर्जा साधन	Non conventional energy resources	खाद्य फसल प्रक्रिया कारखाना	Food crop processing industry
[illegible]क्व मृदा	Immature soils	खाद्य फसल	Food crops
[illegible]क ऊर्जा	Inanimate energy	काँप की मृदा	Alluvial soils
[illegible]कालीन	Ephemeral	ग्रामीण सड़कें	Village roads
[illegible]	Drought	मवेशी	Cattle
[illegible]शिष्ट पर्वत	Residual mountain	गुणात्मक	Qualitative
[illegible]र नवीन पर्वत	Young fold mountain	गोंडवाना लैंड	Gondawana land
[illegible]रण्य	Sanctuaries	दरार	Gorge
[illegible]न वितरण	Uneven distribution	चिकनी मिट्टी	Clay
[illegible]य मृदा	Inorganic soil	जनगणना	Census
[illegible] लेखन	Report writting	जन्मदर	Birth rate
[illegible] साधन संपत्ति	Non-exhaustible	जलप्रणाली	Drainage Pattern
[illegible] धागा	Short staple	जलविभाजक	Water-divide
[illegible]रभूत सुविधा	Infrastructural facility	जलविद्युत	Hydro-electricity
[illegible] क्रिया	Interaction	जलव्यवस्थापन	Water Management
[illegible]ष्ट्रीय व्यापार	International trade	जलसंपत्ति	Water resource
[illegible]य मृदा	Acidic soils	लालमृदा	Laterite soils
[illegible]कार	Rectangular	अधिक दाब	High pressure
[illegible] व्यापार	Import trade	जिला मार्ग	District roads
[illegible] काल	Dry spell	जिरायती खेती	Dry farming
[illegible]गिक युग	Industrial Era	कँटीले वन	Shruby forests
[illegible]गिक फसलें	Industrial Crop	डाक	Post
[illegible]क विद्युत	Thermal Ekectricity	बूँद सिंचन	Drip irrigation
[illegible] स्पंदन	Rhythm of Seasons	नाशवंत माल	Perishable goods
[illegible]	Unity	नार्वेस्टर	Norwester
[illegible]	Satellite	निर्यात व्यापार	Export trade
[illegible] खनिज	Energy minerals	निर्वाह कृषि	Subsistance Agriculture
[illegible] कार्य	Productive functions		
[illegible] प्रदेशीय	Tropical	प्राकृतिक बंदरगाह	Natural Port
[illegible]भाषा	Dialect	प्राकृतिक साधन संपत्ति	Natural resource
[illegible]-सिंचन	Lift irrigation	फौयारा-सिंचन	Sprinkle irrigation
[illegible]	Kadwal	डेल्टा प्रदेश	Delta region
[illegible] दाब	Low pressure	स्टेशन/स्टाप	Halting stations
[illegible]माल	Raw material	दलदली मृदा	Marshy soils
[illegible]ले वन	Throny forests	दंतुर	Indented
[illegible] या अनूप	Lagoon	देशांतर्गत जलमार्ग	Inland waterways
[illegible] जलमार्ग	Coastal Waterway	दुर्गम	Inaccessible
[illegible]ण	Malnutrition	दोहरी फसल क्षेत्र	Double - Cropped area
[illegible]लिका	Tube well	दूरभाष	Telephone
[illegible]ट पालन	Poultry	धातु खनिज	Metallic minerals

पक्का माल	Finished goods	मूल चट्टान	Parent rock
पर्जन्य छाया प्रदेश	Rainshadow region	मृदा (मिट्टी)	Soils
परती भूमि	Fallow land	मृदा संधारण	Soil conservation
परावलंबी जनसंख्या	Dependent population	मृदा का क्षरण	Soil erosion
परिसंस्था	Eco - system	मृत्युदर	Death rate
पर्यटन	Tourism	रबी	Rabi
पर्यावरण अवनति	Degradation of enviroment	राज्य	State
		राज्य महामार्ग	State Highways
वर्षा की अनियमितता	Rainfall variability	राष्ट्रीय महामार्ग	National Highways
पवन ऊर्जा	Wind energy	लंबा धागा	Long staple
पशु संवर्धन	Animal conservation	कृषियोग्य भूमि	Cultivable waste
पशु संपत्ति	Livestock resource	लिंग अनुपात	Sex - ratio
दलदली भूमि	Waterlogged lands	लू	Loo
पानी बहाव क्षेत्र	Catchment area	जनसंख्या की गुणवत्ता	Quality of population
पतझड़वाले वन	Deciduous forests	जनसंख्या का घनत्व	Density of population
पारंपरिक ऊर्जा साधन	Conventional energy resources	जनसंख्या की वृद्धि दर	Growth rate of population
परिस्थिक संतुलन	Ecological Balance	लौह यौगिक	Iron compounds
पार्श्वभूमि	Hinter land	प्लैंक्टन	Plankton
प्राणिज ऊर्जा	Animate energy	वनकृषि	Forest farming
प्रवालद्वीप समूह	Coral islands	वन का पुनर्रोपण	Reforestation
विकसित देश	Developed Countries	आयु रचना	Age structure
प्राकृतिक विभाग	Physical divisions	वन संधारण	Forest Conservation
प्रेरक शक्ति	Driving force	वस्तु विनिमय	Barter
फसल विविधता	Crop diversity	वालुकाश्म	Sanddtone
सफल सघनता	Intensity of Cropping	यातायात मार्गों का जाल	Network of Transport Routes
बालुका तट	Beach		
पुनर्निमाण होनेवाले साधन संपत्ति	Renewable resource	वालुकादंड (रेत के टीले)	Sand bar
		विकासशील देश	Developing Countries
भग्न नहरें	Inundated Canals	वितरिका	Distributary
खली	Oil cake	विविधता	Diversity
बागायती खेती	Irrigated farming	विशेषीकरण का युग	Age of specialisation
बारहमासी नदी	Perennial river	विद्युत ह्रास	Wastage of electricity
बारहमासी नहरें	Perennial canals	वेस्टन बाक्स	Packing Boxes
बहिर्गत व्यापार	External trde	व्यापार का संतुलन	Balance of trade
बहुउद्देशीय प्रकल्प	Multipurpose projects	वृष्टि	Precipitation
भाबर	Bhabar	वृक्षाकार जलप्रणाली	Dendritic drainage pattern
भारतीय उपमहाद्वीप	Indian Subcontinent		
भाँगर	Bhangar	शर्करा	Sucrose
भूखंड मंच	Continental shelf	शाश्वत जीवन मूल्य	Eternal values
भू-जल	Ground water	कृषिभूमि का विभाजन	Subdivision of land
भूमि उपयोग	Land - use	सछिद्र चट्टान	Pervious rock
मध्यम धागा	Medium staple	सदाबहार वन	Evergreen forests
मत्स्य उत्पादन	Fish farming	समुद्रतट के वन	Littoral forests
लौटता मानसून	Retrating mansoon	सागरीय जलमार्ग	Sea-Waterways
मिश्रित फसलें	Mixed cropping	सागरीय मच्छीमारी	Seal fishing
मुक्त व्यापार	Free trsde	सामाजिक वनीकरण	Social forestry

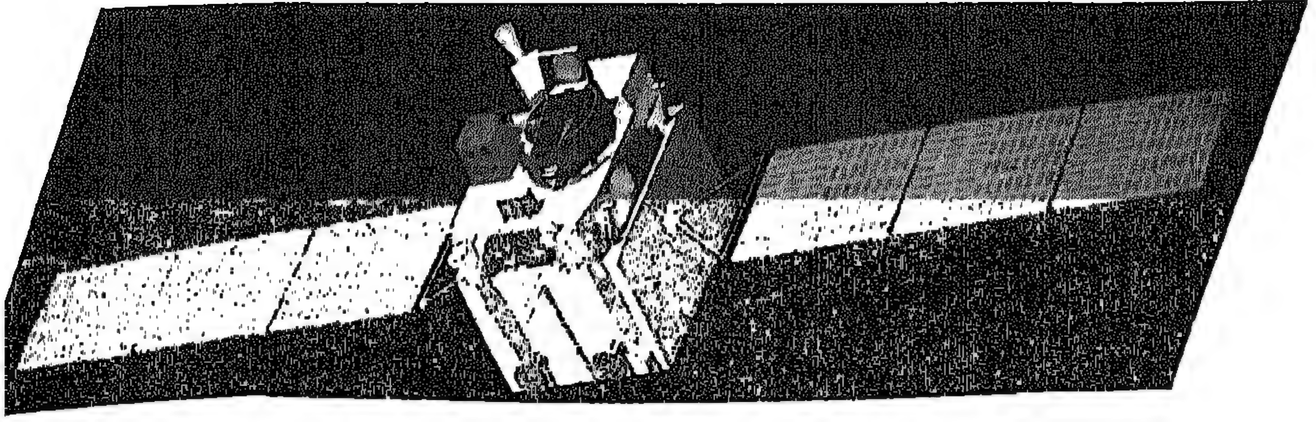
सांस्कृतिक उत्तराधिक	Cultural heritage
सांस्कृतिक भूदृश्य	Cultural landscape
सुगमता	Accessibility
सेंधा/खनिज नमक	Mineral salt
सौर उर्जा	Solar energy
संक्रमण काल	Transition Priod
संख्यात्मक	Quantitative
संगणक	Computer
संघराज्य क्षेत्र	Union Territory
संघराज्य	Union of states
संदेश वहन	Communication
सेंद्रीय द्रव्य	Humus
संरक्षक कार्य	Protective functions
स्थानीयकरण के तत्व	Factors of localisation
लवणयुक्त मृदा	Saline soils
क्षेत्र पुस्तिका	Field book
क्षेत्र अभ्यास	Field study
हरित क्रांति	Green revolution
हरित क्रांति तकनीक	Green revolution technology
मौसमी	Seasonal

मुखपृष्ठ : हिमालय भूदृश्य

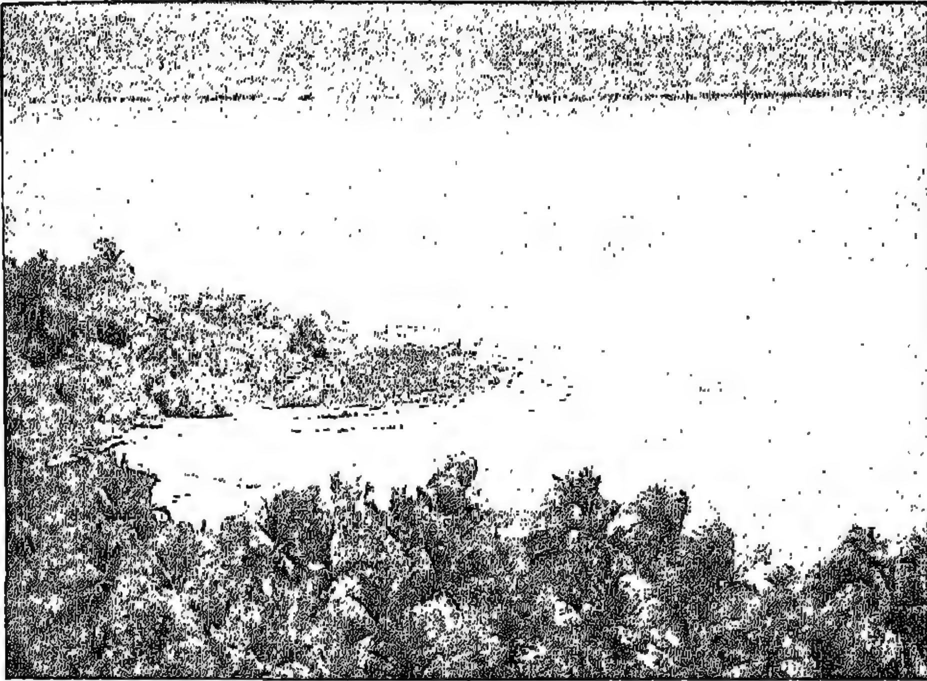
अंतिमपृष्ठ : नारियल का बाग (केरल)
भारत का प्रवेश द्वार (मुंबई)
पहाड़ी प्रदेश का रेलमार्ग (दार्जिलिंग)

Notes to the Maps
The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line. Based upon Survey of India map with the permission of the Surveyor General of India.

The boundary of Meghalaya shown on the maps is as interpreted from the North-Eastern Areas (Reorganisation) Act, 1971, but has yet to be verified.



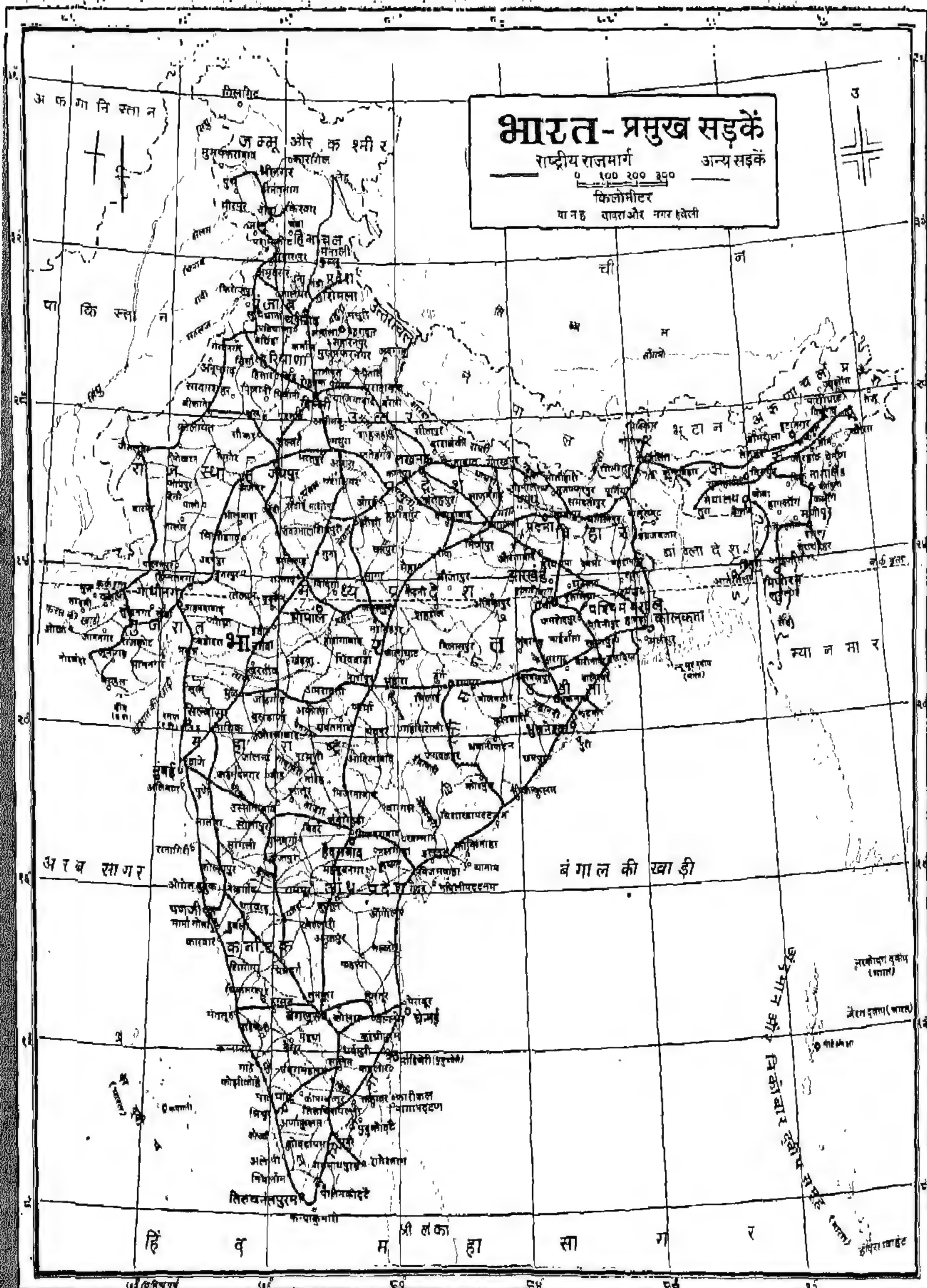
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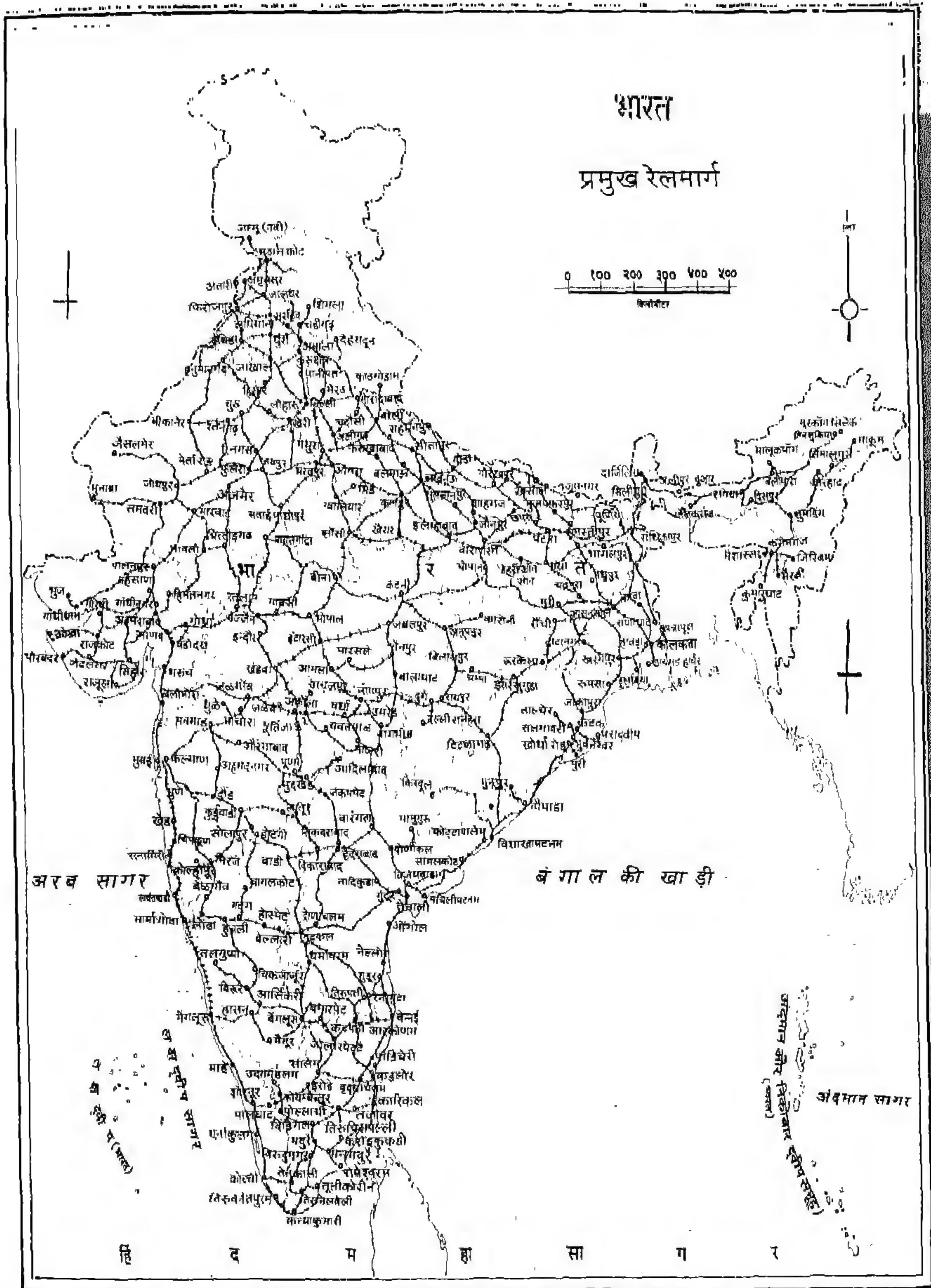


लक्षद्वीप समूह



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available opportunities for suitable work and to ensure their full integration in society.

(iii) Encouraging study and research projects designed to facilitate the practical participation of disabled persons in daily life, for example, by improving their access to public buildings and transportation systems.

(iv) Educating and informing the public of the rights of disabled persons to participate in and contribute to various aspects of economic, social and political life.

(v) Promoting effective measures for the prevention of disability and for the rehabilitation of disabled persons.

The theme of the year is " FULL PARTICIPATION WITH EQUALITY". In other words, integration should replace the present trends towards segregation , enrolment of handicapped children in ordinary schools should replace their relegation to special residential schools and development of sheltered employment should replace discrimination in society.

2. OBJECTIVES FOR INDIA :

India has, since ancient times, extended a humanitarian consideration to the handicapped. Yet for a variety of reasons, the process of rehabilitation of the handicapped has been very slow in our country. India was one of the signatories to the UN resolution

proclaiming 1981 as the 'International Year for Disabled Persons'. This casts on India a special responsibility to observe the year in a fitting manner. In 1981, the Govt. of India would like to lay the ground work of a pattern of services for the handicapped that will reach grass root level and encourage to develop aids and equipment particularly suited to Indian needs. It would also help to widen the base for technological research into their education, training and rehabilitation so that the benefits of these studies would be distributed to as large number of the handicapped people as possible.

Within the framework of the general objectives as declared by the UN General Assembly, the specific objectives to be achieved by India with the help of the present resources may be stated as follows :

(i) To evolve a National Policy on the handicapped, to include education, training, employment and measures to achieve full social integration.

(ii) To collect all relevant data on the handicapped people in the country.

(iii) To lay a foundation of a network of services for the handicapped at the grass root level so that a comprehensive rehabilitation service is eventually provided.

(iv) To initiate a few practical programmes that would carry immediate and significant benefits to handicapped people themselves.

(v) To give a positive rural bias to services for the handicapped since a great majority of handicapped persons live in rural areas(At present, practically all institutional programmes are located in urban areas. Most handicapped people from rural areas have to migrate to cities in order to secure to benefits of rehabilitation services which adds to the problems of urbanisation).

(vi) To develop a strong national disability prevention programme (Currently, only a national programme for the prevention of blindness is in operation. What is important is to develop and put into operation a comprehensive and pragmatic programme for the prevention of other disabilities).

(vii) To prepare a base for research and development through National Institutes so that in the years to come programmes for the rehabilitation of the handicapped should be responsive to change in the social and economic climate.

(viii) To develop a planned network of information and publicity services for dissemination of information on new techniques and programmes for the handicapped and for employers, teachers and social workers. Compaigns to eradicate social prejudice should form an integral part of the plan.

3. BASIC AXIOMS :

We must remember that there are three axioms which are of fundamental importance for all work for the handicapped.

(i) The effect of a disability must always be judged in relation to the present and future circumstances of the person concerned. There are disabilities which may not be handicap in certain circumstances, for instance, colour-blindness is a disability and is for obvious reasons an absolute bar to employment in such occupations as those of 'navigating officer' at sea or 'locomotive driver'. Outside those limited fields the colour-blind worker is at little disadvantage in employment and many colour-blind people live right through their lives without ever discovering that they are not like others.

(ii) Disability, as a rule, is only partial. The assessment of the handicapped persons really needs to be carried out in terms of function rather than of anatomy and physiology. To do it accurately requires closer analysis of the activities of work and daily living in functional terms. There is a great field here for research and it is hoped that serious efforts will be made in this direction.

(iii) To be handicapped is not an unmitigated disadvantage. It may bring real and positive compensation. This dictum is not a mere consolatory platitude but experience in work with the handicapped shows that it is an important truth. History has plenty of examples in which handicapped people appear to have achieve great

successes inspite of their handicaps, but a closer study of such cases suggests that some part of the achievement atleast has been made possible by the handicap itself. Very often the strong will to work and succeed supersedes the disability, the well known example is 'Helen Keeler'.

4. EDUCATION FOR THE HANDICAPPED :

We in this country imported the system of educating handicapped children largely through christian missionaries who came from Europe. As a consequence, special residential school was the accepted pattern for most handicapped children. Unfortunately, the education of handicapped children has been characterised by inertia possibly reinforced by widespread public prejudices.

Looking back briefly into the past, the integration of handicapped children into ordinary schools commonly called 'open education' is a comparatively recent development. There is evidence that in the early 19th century various forms of integrated education were introduced for certain categories of the disabled. But, by the atrocities of time they were not looked upon favourably. It was only after the last war and particularly in the late 1950's that 'open education' was seriously considered as an alternative to 'residential schools'. and the like. Integrated education or open education is not in conflict with the more more established forms of education. It should be seen as complementing rather than competing with existing forms of special education. There are some children for whom

'open education' may not be suitable, perhaps they are of the wrong temperament or their degree of disability is an extremely limiting factor which cannot be overcome by the techniques. On the other hand, there are children in residential schools who could quite easily adjust with the ordinary schools. Due to the simplicity and logical nature of integration, the practical implication of this method of educating handicapped children is reasonably easy to apply in a variety of areas.

In a Rural Open Education Scheme, a specialist teacher - one who has experience according to the category of the child being dealt with is essentially required. The main function of the specialist teacher is to make learning possible. In setting up to build a scheme in a rural area, the first task is to find suitable children, living within a reasonable distance of the school. Secondly, the next task is to carefully interview the children and make a selection. Some may not be suitable on account of age, health or other difficulties. It will be necessary and important to speak to their parents, relations and friends, explaining exactly the purpose of educating the handicapped children, how it is done and why. It is important in the early stages of such work, that the first few pupils should be good ones, so that satisfactory results will encourage other children to join in the scheme.

There are a number of systems that can be used in the 'integrated system' or 'open education' scheme.

(i) THE VISTING TEACHER SYSTEM :

Under this system, a handicapped child attending the primary school in his own village has the help of a visting teacher, who is responsible for a number of children in different schools in the district. The visting teacher supplements the regular school programme by teaching skills requiring individual attention.

It is essential that the handicapped child should be introduced to the school, so that he can get familiar with the layout of the system. He meets the teacher, gets over any nervousness of attending school and settles down with the minimum of disruption to school routine. In this context, prior to the enrolment of the handicapped child in a local school, the specialist teacher would give the class teacher and the Head Master full details of the new child, and would always be at hand to help and advise on difficulties if any. Once these steps are completed the work of the specialist begins with regularity and intense purpose, remembering that it is his job to make learning possible and to supplement the work of the class teacher.

(ii) THE SPECIAL CLASS SYSTEM :

Under this system, handicapped children generally work with able bodied children of their own age in the normal classes but have access to a classroom where books and special equipment are available for subjects which need careful interpretation. In this special class room, a full-time qualified teacher is ready to help them with special problems and to teach

the necessary skills. This teacher is also available to advise regular class teachers, who may require assistance in planning the curriculum and work of the children in their classes.

(iii) THE CO-OPERATIVE SYSTEM :

This system is already working in a number of areas in India. But usually it is suitable where there is an established school for the blind, deaf or orthopaedically handicapped. The two schools - the special school and the ordinary school - co-operate in giving the children the best education possible, by exchanging the teachers between them.

3. URBAN vs RURAL FACILITIES :

The first school for the blind was set up at Amritsar in 1887 and the first school for the deaf was set up at Bombay in 1885. These were two categories of children who received education in the last two decades of the nineteenth century. In 1947 when India attained independence the country had only 32 schools for the blind and about 235 schools for the deaf. The number of schools for blind children has grown about 6 times and that for deaf children 4 times. Schools for mentally retarded children began to be set up in the late thirties and early forties. Special schools for orthopaedically handicapped children are by and large the product of the post-independence period.

Currently not more than 5% blind and deaf children are in school. Since a large number of handicapped children go to ordinary schools, no reliable

information is available about how many receive the opportunity of education. Only a fraction of 1% of mentally retarded children are fortunate enough to enter the portals of a school. We imported not just the pattern of the 'residential school' but also the 'curricula* of schools' for handicapped children from Europe. Towards the end of the 19th century, the industrial revolution had made considerable inroads into the the life style of people in rural areas. As a result, most schools for handicapped children were established in large urban centres of population. The state of technological development was one of the factors that triggered thinking and action concerning the education of handicapped children. Technology flourished in urban areas, this wa another important reason why education of handicapped children has been almost entirely urban oriented.

6. SIZE OF THE PROBLEM :

The present available statistics are as floows :

Sl.No.	Category	Approximately
1.	Blind	3,00,000
2.	Deaf (Dumb)	2,50,000
3.	Orthopaedically handicapped	5,00,000
4.	Montally Retarded	25,00,000
	Total	35,50,000

Thus, India may well have anywhere between 3 to 4 million handicapped childre , this does not

include such categories as emotionally disturbed, brain injured children with specific learning disabilities and the like. If we, in course of time, begin to provide services for a wider range of handicapped conditions, the number may be much larger.

Residential schools have been able to attract a small number of handicapped children. Today handicapped people quite often live and work in segregated institutions. Even when they live in the community they tend to be like 'Robinson Crusoe on a Deserted Island'. Further, the cost of maintaining and educating a handicapped child in the residential school today works out to somewhere between Rs.6000/- to Rs.8000/- per annum. Integration is, therefore, a social and economic necessity.

80% or more of our handicapped children live in rural areas. Migration to urban centres of population calls for a radical change in their life style. Apart from economic reasons, return to rural ways of living becomes virtually impossible for handicapped children in special residential schools in urban centres. The tragedy of segregation arising from social prejudice is heightened by the maladjustment stemming from urbanization. His rehabilitation must, therefore, take place in an urban centre where the competition for economic goodies is already fierce and ruthless. In the unequal fight the handicapped job seeker solicits concessions. His dignity is often thrown to the winds. Thus for social, economic and even

humanistic reasons 'Ruralisation' is a sine-qua-non.

Today, we realise that there is no dichotomy between social action and education, the one is necessary complement to the other. We cannot say that education has taken place until behaviour has changed. The criteria of health education, for instance, must be the improvement of the health in the community. Similarly, the criteria of community's social acceptance of the disabled should be the total welfare - educational, recreational, emotional, vocational, social etc. The percentage of the disabled persons absorption in the main stream of life in relation to the able bodied, their contributions to the community's progress and prosperity; the degree of independence that the disabled achieve in the community should be the criteria of social acceptance.

7. SOME SUGEESTIONS :

1. A National Council similar to NCERT may be set up exclusively for the education, training and rehabilitation of the handicapped persons. This should consist of the representatives of the Govt., Education, Industry, employers and social workers.

2. Regional Committees and State Level Committees should be set up to help the National Council in education, training and rehabilitation of the disabled persons. Their composition may be similar to the above.

3. A General Census and door to door survey should be conducted and a record may be prepared of all categories of the disabled cases with their bio-social data and psychological evaluation as a National Registration. This should be updated every 5 years.

4. International Agencies like UNO, UNESCO,UNICEF and ESCAP etc. should be involved for help and guidance for the implementation of the integrated education programme and other welfare schemes for the disabled.

5. A comprehensive act for compulsory education, training and employment of the handicapped people may be passed urgently.

6. To take immediate steps to draft an educational programme at the primary as well as secondary levels for the disabled and to give specialized traiming to teachers.

7. To establish a few centres in the country to carry out differential diagnosis of disabilities, offer advice on care at home, placement in schools etc.

8. As a first step to developing a national network of integrated education for the disabled children, concerned organisations should be advised to undertake pilot projects on integrated education.

9. To establish a system of collaboration between the National Institutes for the disabled for

developing skill, training and other technological aids for their education.

To organise radio and TV programmes and exhibitions providing relevant literature to the community to educate the people and eliminate the prejudices.

To organise seminars and conferences of local authorities (village Panchayats, zilla parishads, block developments etc.) with educational authorities (schools, teachers etc.) and voluntary organisations and social workers in order to make the society aware of the problems of the handicapped.

Preparations may be taken in hand to cover the maximum number of disabled children in rural areas to receive education, as far as possible through the normal educational system.

Research may be undertaken to identify problems in education, training and rehabilitation of the disabled children and the dynamics of integrated education should be scientifically studied.

Attractive incentive schemes may be started for all agencies responsible for constructing public buildings and transport avoiding access barriers for the handicapped.

To devise a suitable machinery to have overall supervision on the operation of the integrated education programme throughout the country.

Provision should be made to reserve at least 5% seats for all categories of disabled students in ITIs.

17. To develop scholarship schemes for young handicapped children to cover at least a part of the cost of their education.

18. In the professional courses like engineering, architecture, science, catering, medicine, etc. special emphasis should be laid on the problems of the handicapped and the possible contribution by these courses.

19. Arrangements may be made at the local level for educational pre-vocational, vocational, personal and social counselling and guidance.

20. Provisions may be made to give financial aid for transport and other educational and social services.

21. Literacy programmes for the rural population should be initiated to promote awareness of the need for education and rehabilitation of the disabled.

22. To organise recreational, cultural and religious services involving parents, associations of the disabled and other concerned organisations of the community.

23. To give short duration orientation courses to the class teachers and to organise workshops or cooperative societies engaged in agro-based industries.

24. Training Courses should be organised by the government for various levels to develop understanding and appreciation of the problems of the disabled.

25. Since healthy and congenial atmosphere at home is essential for the success of the integrated education of the disabled children, steps should be taken to educate parents and members of the family.

8. CONCLUSION :

Formal attempts of educating handicapped children in India began in the last two decades of the 19th century. In the last century we have provided educational opportunities for a rather insignificant number of handicapped children in urban areas. Services designed for rural children have not yet emerged. It is an open secret that at the State and local level one witnesses only the faint flicker of interest in the education and rehabilitation of the handicapped. The flicker is soon snuffed out by the constraints of resources which have sometimes to be diverted to priority areas like agriculture and irrigation. It is essential, therefore, that the Central Government should come forward with even greater initiative than in the past. Legislation and Legal action can be one of the most formidable tools for social change though it may be true that attitudes cannot be changed by law, we know the fate of prohibition act in several states. Probably, it may to some extent help in the case of disabled. By breaking the barriers to integration, individuals are brought together on unselfconscious basis so that all the member - able bodied and disabled - have an opportunity to know each other in roles different from

group stero types.

In the International Year for the Disabled Persons, it becomes the duty of the nation to focus attention on millions of handicapped children living in rural areas totally deprived of rehabilitation programmes and almost forgotten by the nation. Just as in the last two decades of the 19th century, began a flicker that has slowly developed into a flame of interest, so should the last two decades of the 20th century fan that flame to burst into a conflagration of interest and real aimed at helping deprived handicapped children in rural areas.

Great thinkers like Toyanbee, Sorokin, Huxley, Shakespeare and Nietsche on different occasions have expressed similar views on morality " Morality is a human tendency which serves a positive and useful function . When this tendency is lost or diminished, the future of mankind is endangered. The services to the weak, vulnerable and the disabled could be the measuring rod of the morality of the community". If the morality of the public in our country has to be raised, we must act on this sentiment, here and now.

Therefore, in conclusion I remember the following lines for the disabled :

" Life is mostly froth & bubble,
Two things stand like stone;
Kindness is another man's trouble
And courage in your own".

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1.5.0 EDUCATION OF THE DISABLED

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1.5.1 ABSTRACT

The present paper outlines the need and importance of the development of the disabled persons and their possible contribution to the economic progress, if they are given appropriate training and work opportunities. An attempt to survey the welfare measures so far undertaken by Government agencies and others has been made. The need for educational programmes for the disabled is emphasized, and the list of various kinds of agencies who should be entrusted with the responsibility of educating the disabled. The author identified problems in motivating the disabled and suggestions to overcome them. The major questions to be answered before one is set to make the curriculum for the disabled.

Slight of the world community is want of sufficient appreciation of the disabled's needs and problems, but there is no gain saying that formal and non-formal education are crucial factors regarding participation of disabled in the development process of world communities. Taking note of this phenomena this paper attempts discussing educational programmes for disabled along with four organisational categories together with non-formal, vocational/non-vocational educational programmes, constraints, problems, directions and strategies.

The paper also emphasises the need to change the sympathetic attitude of the abled towards the disabled and a particular attitudnal change among the disabled themselves. The potential skills of the disabled should be matched with

the needs of the society while rehabilitating the disabled. A well co-ordinated effort should be begun and carried on as a continuous welfare project of the disabled.

1.52 Introduction:

The United Nations has designated 1981 as the International year of the Disabled which aims at focussing the attention of the people the world over to physically handicapped persons. The physically handicapped are an integral part of the society and no civilized nation/society worth the name could afford to ignore their right to work and have a decent living. The objectives during the year of designation include helping disabled persons in the physical and psychological adjustment to society, providing better assistance, training, care and guidance and promoting effective measures to prevent disability and the rehabilitation of the disabled.

In the present age of science and technology each and every citizen of the society in expected to assume a dynamic role and participate actively in all spheres of human activity. In the wake of scientific and technological advancement disabled have been provided with a vast number of opportunities whereby they can actualize their potential for work participation and make a significant contribution towards the progress of society. The contribution of an individual toward the development of society depends, to a large extent, on the opportunities he is given to develop himself. In this context, to be fair to them who constitute a small percentage of the world's population and in order to enhance their contribution to society at large, disabled need to be provided with opportunities whereby they may develop to the fullest degree of their potentialities. But inspite of many declarations by policy makers and administrators pledging to remove the hiatus between the abled and disabled, the disabled continued to remain

educationally deprived. The discrepancy between the literacy percentage of abled and disabled is as serious as the discrepancy between abled and disabled with respect to all other levels of education. In fact, the question of illiteracy among disabled is closely related to the question of educational deprivation among disabled in general.

Welfare of Physically Handicapped

Programmes are being implemented for the education, training and rehabilitation of four categories of handicapped persons namely, the blind, the deaf, the orthopaedically handicapped and the mentally-retarded. Three percent of group 'C' and 'D' jobs are reserved in central services and public sector undertakings for the physically-handicapped. From 2nd October 1977, the central government allowed holders of motorised vehicles on which the tax had been exempted by the state governments concerned, a concession of 50 per cent in the cost of petrol/diesel used by the handicapped, subject to certain stipulated ceilings.

Blind

There are 140 schools and training centres for the blind in the country. The National Centre for the Blind, Dehra Dun, provides integrated services. A model school for blind children is attached to the Centre. The Centre also has a training centre for the adult blind, a school for partially sighted children, a workshop for the manufacture of Braille appliances, a sheltered-workshop and the central Braille press. The national library for the blind, which also forms part of the Centre, circulates Braille literature in the country. The four teachers training centres at Delhi, Bombay, Calcutta and Madras train 40 to 50 teachers for the blind, annually.

Deaf

The National Centre for the Deaf at Hyderabad has a Training Centre for the Adult Deaf and a School for Partially Deaf Children, the only one of its kind in the country. The Training Centre imparts training in tailoring, sheet metal work, electrical wiremanship, carpentry, fitting, gas welding and photography.

Orthopaedically Handicapped

A National Institute for the Orthopaedically Handicapped is being set up in Calcutta. The Institute will concentrate on research and training of personnel for the rehabilitation of the orthopaedically handicapped.

Mentally Retarded

A model school for mentally deficient children is functioning in Delhi for children in the age group 6-15. The school also provides training in a few crafts.

Integrated Education

The national policy resolution on education suggests that as far as possible handicapped children should be placed in ordinary schools. A scheme has been drawn up and forwarded to various state governments. At present, 10 states and one union territory are implementing the scheme.

Other Services

Assistance is given to voluntary organisations serving the handicapped and to curing the leprosy patients. The extent of assistance set at 75 per cent has recently been raised to 90 per cent of the estimated expenditure on approved items. The Department of Social Welfare awards scholarships to the blind, deaf and orthopaedically handicapped students for general education and for technical and professional training. About 7,000 scholarships are awarded annually. The implementation of the scheme was

decentralised from 1 April 1977 in 5 states and one union territory. Since 1 April, 1978 the scheme has been further decentralised in another 10 states and in 6 union territories. National awards are also being given every year to outstanding employers of the handicapped and the most efficient of the employed handicapped.

Educational programmes for the Disabled.

While economic factors loom large in the case of every individual and individual nation, the quality of life is also dependent on other factors such as health and nutrition, civic participation, general standards of living and the creative use of leisure time.

Socio-econimic conditions in less-developed countries and the inadequacy of welfare services have made it imperative that the educational programmes focus on the satisfaction of basic needs. Poor environmental sanitation and health standards, malnutrition, and short life expectancy are problems that be set the lives of the disabled. All these countries have non-formal programmes for the disabled in family health education, and in consumer education and home management which dissiminate information and include positive attitudes. Efforts are also to be made to promote participation in civic education programmes.

Despite all this activity and the stress on "basic needs" strategies, the impact of these educational programmes on the living standard of the disabled seems to be almost as negative as the effort of income generating projects on the citizens of a society. Programmes have not reached the poorest and most educationally disadvantaged of the disabled. A multiplicity of organisations have participated in the provision of such non-formal programmes but the absence of central planning or co-ordination has mulitated against the maximum utilization of available resources.

Some of the State Governments offer programmes for the physically disabled which includes, (a) Training cum production centres: in these centres the physically disabled are imparted training to become a turner, welder, machinist, tailoring, Radio and TV servicers and typewriting; (b) Individual oriented scheme such as wheel chairs, artificial limbs, Braille equipment and hearing aids; (c) Economic support Scheme such as Typewriters, Sewing machines, mitch animals, sheet units, siggery and assistance for digging wells; and (d) Institutions such as Special schools for the deaf, dumb and the blind; attached hostels to the above schools, home for aged and disabled, home for the blind and home for physically disabled orphans.

Constraints and Problems:

A bird's eye view of the existing educational programmes has brought out some constraints and problems relating to its (a) access (b) utilization and (c) organisation.

The constraints that are specific to vocational education programmes are a natural concomitant of barriers to the participation of the disabled reflected in the prejudices of employers, parents and other members of families stem from the image of the disabled exclusively as alien to the disabled. Disabled themselves lack adequate motivation to utilize even the limited facilities available to them. The socialization process has conditioned them to accept the under-privileged roles and to lower their career aspirations.

Many of the programmes that exist at present, are outmoded. Meagre facilities, antiquated methods, absence of qualitative and quantitative norms of production and inadequate infrastructural services have rendered many educational courses of the disabled unproductive and futile.

In discussing the educational programme of the disabled the aspects to be tackled are - what kind of approach is

to be adopted to cover all the disabled persons, which agencies are to be involved, what steps are to be taken to motivate the disabled for learning, what content, materials, and methods are to be used, and finally how the educational programmes for the disabled are to be evaluated.

Approach to the problem:

Of course, disabled persons in India constitute, a small fraction of the total population and the rate of work participation among the disabled is again a very small fraction of the disabled universe. This means that a majority of the . . disabled in India are either neglected voluntarily, or involuntarily. In order to reach the disabled, the educational worker has to approach them in their place of residence.

But to reach the disabled in quickly, in terms of effort and coverage, the educational programmes will have to be more in the nature of an extensive-programmes. But to ensure that the educational programme is oriented to the achievement of educational objectives as set forth under the vocational education for the disabled, the elements of an intensive approach will have to be incorporated in the programme.

As has been proposed by all many education no doubt will have a special place of its for the disabled, but the principal objective is to increase the awareness of disabled people about themselves, and about the social reality around them, and to organise them to assist themselves and also understand and strive to solve the different problems in their day-to-day life and to involve them in meaningful and challenging tasks of social and individual development. Besides this, the main elements of the education of the disabled will, therefore, include an appropriate 'mix' suited to the needs and interests

of the individual of such themes as general education including citizenship training, health education, upgrading of vocational skills, deeper understanding of science and technology in day-tp-day life and physical education and cultural activities. To achieve the aim of imparting education among the disabled in conjunction with promoting social awareness and developing an ability to solve the different problems faced by them both formal and non-formal channels of education would have to be utilized. In imparting the necessary knowledge and skills and inculcating the desirable attitudes among the disabled, a multifacet approach needs to be adopted where due importance would have to be given to all kinds of media of mass communication like newspapers, radio, and television.

Agencies:

A prerequisite of education of the disabled is that all agencies, governmental, voluntary, private and public sector industry, institution of formal education etc. should lend strength to it. Education of the disabled is being looked upon as a means for an all round development of these individuals. In view of this, ministries/departments other than those of education could be involved to provide the functional development component. The involvement of agencies other than the Governmental is also required because, (a) Education of the disabled is so colossal in nature that no single agency can undertake its implementation on a single-handed basis; and (b) it should be relevant to the needs of the disabled, flexible regarding duration, timings, location, etc., and diversified with regard to curriculum. Governmental structures are not necessarily the most appropriate for organising diversified and flexible learning opportunities which aim at enabling the people to take over the responsibility for other own

development. In this context, the voluntary agencies shall have to play a significant role in implementing education of the disabled. The role of government would mainly be to co-ordinate the activities of various agencies which involve themselves in implementing the education, and to fill the gaps.

It can be suggested that autonomous organisations like the welfare boards having branches in the districts and villages can play a significant role in the organisation of educational programmes for the disabled. The welfare boards have a large number of organisations such as Mahila mandals which may help in the implementation of educational programmes. A number of other local religious, social and cultural organisations such as Bhajan mandals, Youth clubs, Harijan Sevak Sanghs, sports club, dance, drama, and other cultural groups may also be involved in providing education to the disabled. There is large variety of institutions which cater to one or the other aspect of the disabled should be encouraged to undertake educational programme for the physically handicapped person.

It may, however, be added that the decisions regarding the involvement of a given agency will depend on a number of factors such as local conditions, expressed needs, interests, and aspirations of the prospective learners.

Motivating the disabled for participation in the educational programmes

What is earnestly needed is a systematic analysis of the factors which motivated the disabled to learn and consequently to come to the class. By the same token it is necessary to find the factors which dissuade the disabled from wanting to learn and join in the educational programmes. The disabled whether male or female is deeply embedded in his own set of preferences and prejudices, has a wide variety of complexes including complexes about his/her

ability to learn - is subjected to a complexity of forces. He/she is unaware of many rights provided to him/her constitutionally.

Traditionally the disabled often course themselves for being born in to the world and their role in the society as a worker and public being is completely ignored. In such sporadic circumstances, how can one expect that they could be allowed to attain education. It is quite obvious that old traditions and customs, social prejudicies, apathetic attitudes of the elders and so on will still be working as deterrent forces in keeping the disabled out of the educational sphere.

It is the educational planner who has decided that uneducated disabled are to be educated and are to be made socially aware. Here it is not the disabled who go to the educator with any demand for becoming literate or socially aware or has expressed any keenness to understand the social reality around him/her.

In this context, the first step should be to find out whether or not disabled are willing to get what the policy-makers want to give th them. Moreover, the planners on the one hand aim at fulfiling the needs of the individual learners, and on the other at involving them in meaningful and challenging tasks of national reconstruction.

Even after the disabled has joined the General/Vocational education class, some of the factors which initially dissuaded them from joining the class still continue to have an influence on them. In addition some other factors like the unsuitability of time and place of study, uninteresting materials and methods may cause them to be irregular and uninterested in educational schemes for the disabled.

Curriculum for the disabled:

Technically speaking, in constructing any curriculum four basic Questions to be faced by the curriculum-planners. 1. What is its purpose? 2. What subject matter is to be used? 3. What learning experiences are to be provided? and 4. How are the results to be assessed?

Regarding the formulation of curriculum for the disabled the questions to be settled are - what approach is to be adopted - formal, non-formal or a combination of the two, who should construct the curriculum, what should be the content, what materials and methods should be used and how should the results be evaluated? Out of these questions two, namely, who should construct the curriculum and what content should be included are very crucial questions. There are different opinions as to who should be responsible for formulating the curriculum. Some educationists are in favour of giving the whole responsibility to General/Vocational education workers, while others are of view that it is to be left with the technical expertise and should be undertaken by a team of inter-disciplinarians. Out of the some dissuaded factors which are mentioned in earlier sections, the only factor which attracts is curriculum and if curriculum is need and interest-based the chances of the learner coming to the class regularly would be quite high.

It has been emphasized that the education of the disabled would be flexible and need-based. But the term need-based has two connotations: the programmes may be based on the needs of the adults as perceived by the curriculum planner or on the needs as perceived by the learners themselves. It needs no explanation that the needs as perceived by the curriculum planner may not coincide with the needs felt by the learners themselves. The curriculum planner comes

from a social milieu quite dissimilar to that of the learner and is therefore not very competent to understand the real needs of the learners

The content of curriculum generally, should include occupational improvement, increasing employment potential, better home and family living, effective participation in civic and community affairs and environment of life.

The foregoing discussion makes it clear that no concrete content could be specified for any particular group. Only a few broad guidelines could be provided:

1. The curriculum should be on the one hand functionally relevant to the needs of the individual and on the other related to the needs of the society.

2. The content should be neither purely need-based nor interest-based.

3. The curriculum should be tailored to meet the immediate and specific needs of the disabled.

4. It should promote an all round development of the individual.

Finally a word about the evaluation of the educational component of the disabled. For an adequate assessment of results a continuous, well planned, comprehensive, and broad-based appraisal of all aspects of the education is called for. The evaluation should cover both quantitative and qualitative aspects with special reference to the integration and interpretation of behaviour changes.

In evaluating the impact of the education of the disabled, the disabled as well as the functionaries of all levels should be involved and both objective and subjective measures should be resorted to. Some such behavioural changes may have taken place among the disabled of which they themselves would be the best judges and there may be no opportunity for the educationist, or the researcher to

observe them. For instance, the attitude of the able bodied towards the disabled may have undergone some change; they may have adopted some new and promoting practice or they may have stopped believing in a certain omen - in all these cases, the disabled themselves would be in the best position to assess the impact of the learning experiences provided for them.

Direction

While educational programmes can never be a substitute for long term development directed towards attacking poverty and inequalities they are useful instruments in effecting structural and attitudinal change, by promoting educational opportunities and eliminating discrimination. It needs to be considered that:

a. Educational programmes for the disabled are integral components of development policies and not ad hon programmes.

b. Such programmes permit the disabled to play a positive role.

c. National development policies are examined for negative impact on the participation of disabled women in different sectors of national life.

Target groups

Educational programmes are part of an interlocking process of continuing education. The successive implementation of any programmes requires the support of programmes in educational and vocational guidance as well as planning to meet the needs of the disabled in different situations. Where educational programmes are concerned, the diversity of potential target groups calls for flexibility and innovative approaches. Among such target groups are:

a. The orthopaedically handicapped who leave the school at an early period, who have no income or the least income and suffer the most hardship and who need assistance in improving their living standards.

b. The deaf, and the slightly mentally retarded persons who are often employed and exploited as casual factory workers who need access to programmes that will enable them to participate in more remunerative and stimulating economic activities.

c. The blind, who have been educated in Braille method and unemployed who need professional and technical training in traditional as well as non-traditional areas, such as precision skills in technical work.

d. Creative disabled persons who wish to develop their talents.

Strategies:

Flexibility in organisation and the adoption of alternative strategies are necessary to meet the needs of the disabled. Such programmes should include: a. Part time employment and retraining facilities for those returning to work after a lapse of some period.

b. Training in entrepreneurship for disabled in self-employment.

c. Home-based activities such as:

i. Home gardening and animal husbandary for disabled women.

ii. Local training cum production centres for training in crafts and small industries located within a reasonable distance from home geared to the production of useful articles of excellent quality.

d. Locally based rather than metropolitan centred multi purpose centres, particularly in rural areas, to ensure co-ordination of non-formal educational programmes for the disabled.

The State Governments can have their own plan of action in confimity with the national plan of action for the International Year of the Disabled. The District Collectors and Social Welfare Officers should be directed

to give priority in rehabilitation of the handicapped and in extending medical care and treatment, grant of travel passes and provision of self employment ventures to the handicapped.

Conclusion:

Finally, if there is to be optimum participation in present and future educational programmes disabled themselves must be more strongly motivated to seek ways of improving their quality of life, to take pride in professionalism and career commitment and to participate in the exercise of civic responsibilities at the decision-making level. The enthusiasm generated by the International Year of the Disabled has to be sustained by creating consciousness and a positive image of the disabled as partners in the process of national development. The International Year of the Disabled should be the beginning for a well-coordinated educational, training and employment oriented effort by all the involved agencies in the long way to go and should be a continuous scheme of action that goes beyond 31st December, 1981.

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A STUDY OF PREDICTIVE ANTECEDENTS OF SPECIFIC READING DISABILITY (SRD)

by

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ABSTRACT

The term disability, handicap and disabled are classified at the outset since they carry implications for educational decisions. Disability is an objectively defined deviation in physique or function that, through interaction with a specific environment, results in behavioural inadequacies or restrictions for the person. The negative consequences of inadequacies comprise the handicap. Educators attempt to (1) change the deviation, (2) change the environment, or (3) both.

Disability, being the product of interaction of personal deviation with an environment, is not exclusively a personal characteristic; then why use a negative term disabled, a better term may be to refer to 'a person with a disability'.

The term learning disability encompass a variety of problems (recognised by teachers) in the area of learning which are not related to retardation or the cultural deprivation. This category is therefore most important to schools and educators.

Using Money's term, Specific Reading Disability (SRD) is an important learning disability, because 'reading' is a basic tool for all other academic learning

Therefore, early prediction of SRD and detection of potential SRD children, so that appropriate interventions may be applied during critical development periods when the child's plasticity may enable him to maximally respond to preventive or remedial efforts, is most desirable.

The second part of the paper is devoted to a synopsis of a research project : A Study of Predictive Antecedents of Specific Reading Ability (SRD) of Grade I Children. After discussing the nature and causes of SRD, briefly reviewing some related studies the research design is outlined. The design visualises multivariate analysis including factor analysis and discriminant function analysis. For identifying the potential SRD children, the use of Discriminant Function Test Scores is suggested.

INTRODUCTION

DISABLED OR WITH A DISABILITY

Many common words are sued in a technical sense also. Disabled is one such word which is most frequently used to mean a handicap. Since these terms carry implications for educational decisions they must be differentiated (Hamilton, 1950).

Stevens (1962) describes Disability as (1) a deviation in body or functioning, (2) that results in a functional inadequacy, (3) in view of environmental demands. Handicaps are the disadvantages and social censures (that is, various degrees of punishment or loss of reward) that are generated by a disability.

Hamilton, K.W. Counselling the handicapped in the rehabilitative process. New York: Ronald Press, 1950.

Stevens, G.D. Taxonomy in special education for children with body disorder: The problem and a proposal. University of Pittsburgh, 1962.

Disability relates to some actual object measurable deviation in physique or functioning. Bu differ or deviate from the average in a multitude of Individual differences in height, weight, skin colour, aptitudes, interests, personality traits, biochemical usually go unnoticed or unlabeled as deviations. Thes then, differences that make no difference. Why? Wheth or not " a difference makes a difference" depends on an crucial consideration: the environment or the cultural demands. Variations in skin colour which make no differ in India, make a difference in America. Variation or dev is relative to the context. Deviations rewarded in one culture may be punished in another and may receive no effective consequence in some other.

Disability, then, is an objectively defined deviation in physique or function that, through interaction with a specified environment, results in behavioural inadequacies or restrictions for the person. Disabilities do not exist within the person himself, in other words, a disability is not exclusively a personal characteristic. It is the product of the interaction of an individual difference with an environment. So the term disabled is inappropriate, since it overlooks the role of the environment and implies that the defect lies within the person. Not an ideal, but a better term would be to refer to persons with a disability, that is, persons whose functioning in an environment places them (persons and environment both) at a disadvantage. The disadvantage subsequently results in loss or reward. The negative consequences comprise the handicap.

An illustration will make this clear.

1. A child has some deviation in physique or functioning, for example, a hearing loss.

2. The environment, especially the academic environment, includes demands or expectations that make success less probable and punishment more probable.

3. The hearing loss, which may not be a crucial problem in other settings, becomes a disability in the standard academic environment.

4. As a result of the disability a social, emotional and academic burden, i.e. a handicap, is imposed on the child.

5. The handicap becomes extreme, thus focussing attention on the deviation (i.e. hearing loss). With the focus on deviation, this particular characteristic of the person becomes a cue or a stimulus that influence the behaviour of the teacher and others.

6. The altered behaviour of the teacher and other students, frequently providing lowered expectations, pity, restricted learning opportunities, minimised access to reward and various stresses, feeds back to the child.

7. Eventually, the child begins to refer to himself as less perfect, less valuable and less competent. The lowered self-referent behaviour of the child becomes a continuing personal cue for even lower levels of functioning.

8. Finally, the continued negiative self-referent behaviour, the increasing disabilities and subsequently increasing handicaps may produce not only an aggravation of the original deviation but additional deviations in body or functioning. The child, in all probability, will develop

a variety of emotional behaviours, social withdrawal, aggressiveness, fears, or decline in various constructive behaviours or all of these. These new problems or deviations then become the source for a whole new series of interactions with the environment that produce more disability and subsequently, greater handicap.

Since disability and subsequent handicap are the product of personal deviation with an environment, educationists attempt to (1) change the deviation, (2) change the environment, or (3) both. An appreciable change in either will alter and short-circuit the usual resultant chain of problems.

Special education has been philosophically committed to minimising negative deviations. Developing intelligence, modifying social behaviour, improving vision and hearing, developing psychomotor coordination, and raising competence in reading, writing or arithmetic are all attempts to reduce deviations.

THE DISABILITIES

The nomenclature used to classify disabilities has been greatly influenced by disciplines and professionals outside of education. Therefore, the labels used reflect a preoccupation with medical, psychiatric and sociological perceptions that are, at best, remotely related to educational decision-making. They rarely tell the teacher: WHO can be taught IN WHAT WAY. So, one can put five or six labels on the same child and still not know WHAT to teach him and HOW.

The major traditional categories of disabilities are :

1. Sensory Disorders: (1) Deaf: (b) Blind

2. Motor Disorders
3. Communication Disorders
4. Behaviour Disorders
5. Mental Retardation
6. Learning Disabilities.

Each of the above major categories has its sub-classes, such as deaf and partially hearing: slight (27-40 db), mild (41-55 db), moderate (56-70 db), severe (71-90 db) and extreme (91 db or more).

The Learning Disabilities : This last category is a relatively recent addition. Its domain has not been reliably charted. The concept of learning disabilities is mysterious and complex. It includes notions of brain damage, hyperactivity, mild form of retardation, socio-emotional adjustment, language difficulties, subtle forms of deafness, perceptual problems, motor clumsiness and, above all, reading disorders.

Attempts to define the term learning disabilities have created confusion rather than clarification of the concept. A part of the problem arises from the fact that we lose sight of "what the definition is for". The definitions are not truths, they merely set up conditions under which particular actions are to be taken, for example, grants for research for an area given priority, grants for support of children who have special education needs, or making reservations in employment. Still, there is some agreement on the elements of learning disabilities namely :

1. Academic retardation may exist

2. An uneven pattern of development exists
3. The individual may or may not have any central nervous system-dysfunction.
4. Learning problems are not due to environmental disadvantage
5. Learning problems are not due to mental retardation or emotional disturbance.

I can say with a certain degree of confidence that no research work has been done in this area in our country and as such, a review of studies done in India is out of the question. But this area is of great importance to educators and schools as it is concerned with the disabilities of those children who are average or above average in general mental ability and have learning problems which are not due to environmental disadvantages.

The areas of learning disabilities which need early investigation are listed below :

1. Precise descriptions of specific observational behaviour related to dysfunctions in learning.
2. Procedures for recording those behaviours.
3. Procedures for educational assessment and diagnosis.
4. Prevalence and incidence.
5. Effective remedial or compensatory methods of intervention.
6. Prevention.

The synopsis of a proposed research investigation on "reading disability" is given on the following pages.

ii) Nature and Causes of SRD: Satz and associates (1970, 1971, 1972) attempted to clarify the nature and the causes of SRD. Satz feels that SRD is not a unitary syndrome but rather reflects a lag in the maturation of the brain (left hemisphere) which delays, differentially, those skills which are in primary ascendency at different chronological ages. Therefore, visual-perceptual, visual-motor and directional-spatial skills, which usually appear quite early, are likely to be delayed in children whose maturation process is slow. On the other hand, language development is more likely to be observed in older children who are delayed maturationally. In other words, when the maturation process is delayed, corresponding delays in the consequence of the developmental skills are predicted. This view of Satz is compatible with those developmental positions which postulate that the child goes through consecutive stages of thought during development, each of which incorporates the process of the preceding stage into a more complex and hierarchically integrated form of adaptation (Bruner, 1968; Hunt, 1961)

Satz, P. and Sparrow, S. "Specific Development Dyslaxia; A Theoretical Formulation". In D.J. Bakker and P. Satz (Eds), Specific reading disability: Advances in theory and method. Rotterdam: The Netherlands: Rotterdam University Press, 1970, pp. 17-40.

Satz, P., Radrin, D. and Ross, J. "An evaluation of a theory of specific developmental dyslexia". Child Development, 1971, 42.

Satz, P. and Van Nostrand, G.K. Developmental dyslexia: An evaluation of a theory. 1972 Part II, Chapter 6 of this publication, pp. 121-148.

Bruners, J.S. "The Course of Cognitive Growth". In N.S. Endler, L.R. Bouleter and H. Osser (Eds). Contemporary Issues in Developmental Ps-ychology, New York: Hotl, Rinehart and Winston, Inc.1968. pp. 476-494.

Hunt, J. Mc. V. Intelligence and Experience. New York: Ronald Press, 1961.

Gibson (1968) found that the younger dyslexic child (in contrast to his age-matched control) is delayed on a number of perceptual-motor skills which are crucial to the early phases of reading. Further, by contrast, the older dyslexic child (as opposed to his age-matched control) does not evidence any significant delay in these earlier-developing perceptual skills, but, rather, lags behind substantially on a number of language skills which are crucial to the later phases of reading.

The above findings suggest that developmental delays in the initial primary school years (classes I and II) may forecast different and, perhaps, more severe delays in language integration in later years. Although, the child lag behind in certain early basic perceptual skills crucial to readinghe eventually overcomes these early lags but may then lag behind in those skills which develop ontogenetically, later. In other words, this implies that the mechanism which undertakes the maturationallag affects the rate at which the developmental milestones are reached and, therefore, early delays in the maturation process (in classes I and II) may forecast the nature and severity of the later reading disability. This postulate of Satz puts the problem within a developmental frame rather than a disease model, such as brain damage.

ii) The importance of Satz's view is obvious for conducting an empirical study. Firstly, it is possible to identify early antecedents of later reading disability before formal reading instruction is begun. This can be done

Gibson, E.J. Learning to read . In N.S. Endler, L.R. Bouleter and H. Osser (Eds.) Contemporary Issues in Developmental Psychology. New York. Holt, Rinehart and Winston Inc., 1968, pp.291-303.

at the age of 5-7 years. Secondly, the early identification at the age of 5-7 years has an advantage from intervention point of view, because the child is generally free from personality problems (Gates, 1968) as also at that time CNS is more plastic, subject to rapid growth.

iii) Brief Review of Related Studies : No work in India has been done, as already stated; some studies are available from other countries.

Hirsch, Jansky and Longford, (1968) has a very ambitious project, a longitudinal investigation of three-year follow-up of kindergarten children. The number of predictors was quite large, 37 in number, the sample size was 106 consisting of both males and females belonging to different races. The parents belong to a low income group. The investigators were able to identify a small number of potential reading disabled children who later developed severe problems in reading and writing. An interesting finding was that visual-perceptual and perceptual-motor tests proved to be particularly sensitive in terms of both maturation and predictive validity. Therefore, the tests which were maturation-sensitive (i.e. age related) were uniformly more predictive by the end of the second grade.

Gates, A.I. The role of personality adjustment in reading disability. InG. Natchez, (Ed.). Children with Reading Problems. New York: Basis Books, Inc., 1968, pp. 80-86.

Hirsch, K. de. Jansky, JJ. and Longford W.S. Predicting reading failure: A preliminary study. New York, Harper - Row, 1966.

Sapir and Wilso (1967) conducted a study on 57 children. They assessed the predictive validity of kindergarten measures eight and seventeen months after initial testing. The criterion was Reading Readiness Test. Perceptual-motor tests were again found to co-relate highly with the criterion. The findings again point out the relevance of perceptual skills in Reading Readiness.

Weiner and Wepman (1971) using a three-year follow-up of 50 black disadvantaged children showed that percepual and perceptual-motor instruments were extremely sensitive predictors of school achievement at the end of the third grade.

From this brief review, it could be concluded that measures of skills which are in primary development at the early ages are more useful when early prediction indices are required. Furthermore, we know that multivariate designs, including factor analysis, can afford a reduction in the test battery besides increasing the predictive validity of the instrument. Therefore an investigation to determine the predictive antecedents of Specific Reading Disability (SRD) in grade I children using multivariate paradigm has been designed.

Sapir S.G. and Wilson B. M. "A developmental skill to assist in the prevention of learning disability". Educational and Psychological Measurement, 1967, 27, 1061-1068.

Weiner, P.S. and Wepman, J.M. The relationship of early perceptual level function to later school achievements in black disadvantaged children. Division of Research and Administration Grants, Social and Rehabilitation Service. Department of Education and Welfare, Washington, D.C. 20201, 197.

RESEARCH QUESTIONS

1. Are there predictive antecedents of later SRDS' ?
2. Can potential SRD groups be correctly identified during the early years of primary education?
3. In what variables do the potential SRD children lag six months or more behind their chronological age? Is this discrepancy also observed in SRD groups?
4. Is the nature of the primary factor (first factor) sensory-motor or perceptual?
5. What is the effect of socio-economic status on SRD?

Methodlogy

Predictor Variables

1. Handedness
2. Eyedness
3. Right-left Discriminations
4. Fine Motor Development
5. Visual-perceptual skills
   (a) Recognition Discrimination
   (b) Embedded Figures
6. Visual-motor Integration
7. Intelligence
8. Somato-sensory Development
9. Auditory, Discrimination
10. Measure of Ear Asymmetry-Dichotic Listening
11. Auditory - Visual Skills.

12. Maturity : Physical, Emotional and Social
13. Socio-economic Status (SES)
14. Age in days
15. Day of Testing: As testing will be individual and spread over about 100 days, to determine whether discrepant amounts of schooling affected the test battery results, day of testing designations (ranging from 1 through 100) will be assigned to each child.

N.B. : The instruments used to measure the different variables will be apparatus, performance and non-verbal materials which may be readily available.

CRITERION VARIABLES

The children will be classified into :

(a) Potential SRD Group

(b) Not SRD Group

Three measures of achievement will be used to obtain criterion estimate :

1. Teacher ratings to predict likelihood of Learning Difficulty.
2. Scores on a Survey Reading Test.
3. Scores on Criterion Reference Test

SAMPLE

A compact locality, having about 500-1000 children of age group 5-6 years, and with most of the children taking admission in Class I of the locality schools will be selected.

DATA COLLECTION

The children will be tested individually by trained

testers on school days in separate cubicles especially equipped with the instruments to provide measures of the variables. Five to ten children will be tested each day.

DATA ANALYSIS

Factor Analysis, including all predictor and criterion measures, will be done in order to ascertain the composition of sub-tests of covarying variables. A principal axis solution with varimax rotation may be obtained.

Discriminant Function Analysis : In order to achieve maximum differentiation between the potential SRD and Not SRD criterion groups, a discriminant function analysis will be performed. This would help in obtaining some linear combination of the variable that would maximise the 'between a group' differences relative to 'within a group' difference.

A composite discriminant score based on his raw scores and the optimal weighings for each variable will be computed for each child in both criterion groups. If the mean discriminant composite scores of the two criterion groups groups are different they will permit the assignment of children to different criterion groups.

Regression Analysis : The prediction studies utilise the technique of Linear Regression in their solutions. Step-wise regression analysis of discriminant function composite scores by test and factor loadings will be performed.

"A Study of Adjustment of the Blind and the Deaf Students in standards V, VI and VII of Special Schools in Karnataka "

By

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ABSTRACT OF THE RESEARCH PAPER

The aims of education of the disabled are generally the same as for normal students, but there is a difference in the emphasis. Research studies indicate that development and adjustment should be given priority in the aims of education of the disabled.

The objective was to study the adjustment levels of the blind and deaf students in standards V to VII in the special schools in Karnataka and to compare the adjustments of the blind and deaf class-wise and areawise. The five areas selected are adjustment to home, school, peer, teacher and general were included. All the students of standards V to VII in all the schools in Karnataka except two were selected for the study.

The tool used was the PAAS developed by Udai pareek and Venkateswara Rao. The data was computerised for finding the Means and Standard Deviations and correlation coefficients.

The findings are:

1. Both the blind and deaf have positive adjustments, but the blind have significantly higher scores than the deaf.

2. Adjustment to teacher is lower as compared to adjustment to other areas.

3. There is a high correlation between pairs of all areas for both the blind and the deaf.

These findings indicate significants implications for selection and training of teachers and for facilitating

better adjustment of the deaf, in schools.

This study was conducted with a limited number of deaf and blind students in a few schools in Karnataka.

Genesis of the problem:

Interest in the welfare of the disabled is of recent development. In ancient times, the disabled persons were considered as born with a curse from God. They were therefore, either neglected as in many countries or deliberately left in valleys or on hills to die, as in Sparta. This was done to build up a nation of strong and able-bodied persons.

It was with the advent of Buddha and Christ that a sympathetic attitude towards the disabled developed. The disabled continued to be ridiculed for their physical or mental disabilities in several countries. It took many centuries for the people to begin positive effort for the education and welfare of the disabled. The first public school in the world for the schooling of the disabled was started in 1760.

During the last five decades there has been a perceptible increase is the interest, all over the world, in the welfare of the disabled, culminating in the United Nations declaring the year 1981 as the "International Year of the Disabled".

Aims of Special Education for the Disabled

The aims of special education for the disabled are basically the same as for the others. Except for a difference in the order of priorities. As Gulliford puts it, "in the education of children with special needs, the first priority is to promote the optimum development of the child's capacities, personality and adjustment." According to him, the aim of adjustment in special education emphasises the need to ensure that disabled children are being educated

so that they have adequate preparation for successful adjustment to living and working in the community after they have left school.

While adequate educational preparation gives a distinct advantage to them in getting jobs and functioning in society, experience and research show that personality and social adjustment are relatively more important. This has been aptly and emphatically stated by Nimbkar who says:

"What are the primary needs of a handicapped man? The food? The clothing? The shelter? Give him all these and luxuries too. But deny him the right to live, by isolation. And you have killed his soul."

Because of the priority of adjustment as an aim of education of the disabled, its nature extent and specificity of adjustment related to various operational areas in life deserve special attention in the studies and researches related to the education of the disabled.

Review of related studies:

Generally, problems related to the education of the disabled children have not attracted the attention of researches in education, though here and there you come across some studies of a general nature concerning the nature of disabilities and the problems faced by the disabled in life. Even the few studies one comes across, rarely deal with adjustment of children in school life. This highlights the paramount need for study in this area of adjustment.

A study by Kirk found a significantly greater number of problem tendencies among the deaf than among the normal hearing children. Similarly, Springer and Roslow's study confirmed that the deaf subjects received much higher scores in neurotic tendencies than did the hearing subjects.

Klich and others studied the "Social interaction and emotional adjustment among the blind." They tested the hypothesis that the level of a blind persons level of adjustment to his handicap is positively related to his

involment with a group of other blind persons. Group members did not have a high level of adjustment with the non-blind.

Is there a significiant difference between the partially disabled and fully disabled on the basis of which they can be treated separately in education? Bowyer and Gullies studied the "Social and emotional adjustment of the deaf and the partially deaf children". 60 severely and 80 partially deaf children were studied for emotional adjustment using the Lowenfield Mosaic and Word Techniques and the R Zust Village Test. For social behaviour they used teacher's ratings. No significant differences were found between the severely and the partially deaf.

Miller studied the manifest anxiety in visually impairred adolescents, including both the partially sighted and the blind. No significant differences in levels of anxiety were found between the partially sighted and the blind. These findings point to the need for combining the partially and fully disabled in respect of education for adjustment, but in other areas, researches need to be conducted to come to valid decisions. Even in the area of adjustment, the problem may differ. from country to country and from community to community. The same findings may or may not hold good. Studies conducted by Lyon and Ronald in respect of the deaf and a study by Kim Yoon in respect of the blind and studies by Kissin Gerald in respect of the handicapped and by R. Hemamalini of Madras in respect to blind and the deaf - all tend to suggest the need for further research in the area of adjustment or personality development.

Formulation of the Problem

Adjustment is a life-long process and specially important in the formative years coinciding with the years of schooling. The child who first develops patterns or practices of adjustment to home life has to learn new patterns or modes of behaviour related to school life. Here he has to

develop adjustment to his peers, to his teachers and to the school as a whole. There may be situations outside the home and the school where the child will be required to meet and deal with people. This area may be termed as general for the purpose of convenience.

It may be that a child well-adjusted to home, may find it difficult to adjust to peers or teachers in school. Likewise, it may be possible that a child who has adjustment problems at home may carry his problems to school or may find a happy escape in school. A study of the problem of adjustment has to be done with reference to specific areas as well as to his whole life to be of practical guidance and use to educators and parents.

Secondly, children in standards I to IV are too young to respond meaningfully and reliably to a verbal tool. The pre-adolescent and adolescent stages are the most appropriate and effective stages to provide significant findings. A sufficiently large number of children for category-wise comparasions could not be availed of in standards VIII to X.

Keeping all the above considerations in view, the researcher formulated the following problem for the study:

" A study of the adjustment of the blind and the deaf students in standards V, VI and VII of special schools in Karnataka".

Objectives:

1. To findout and compre the extent of adjustment of the blind and deaf children in standards V to VII.
2. To find out the extent of their adjustment in the five areas, namely home, school, peers, teacher and in other general aspects.
3. To find out the inter-relationship of adjustment in the five selected areas.

4. To find out the difference if any between adjustments of children in different standards.
5. To infer possible implications of adjustment of the blind and deaf in school.

Operational definition:-

It is necessary to define adjustment as accepted in this study.

Adjustment has been defined by English and English (1958) as a condition of harmonious relation to the environmen wherein one is able to obtain satisfaction for most of one's. needs and to meet fairly well the demands, physical and social put upon him.

In the present study 5 areas were chosen and a sample situations familiar to the pre-adolescent, in each area were used to measure the level of adjustment.

In this study adjustment is defined "as the individual orientation towards his parents, peers, school, teacher and himself, in terms of the satisfaction he derives from his interactional relationship with these.

Research Design

Variables Adjustment to home, school, peers, teacher and general are areas related to adjustment.

Hypothesis

1. The blind and the deaf do not differ in their level of adjustment in the five areas selected.
2. There is no inter-relationship between adjustment levels in the five areas in respect of the blind or the deaf taken seperately or together.
3. Standard-wise adjustment levels do not vary significantly in the five areas both in respect of the blind and the deaf.

Sampling -

Special schools for the physically handicapped having standards V to VII existed only in Mysore, Banglore, Hubli and Gulburga. The school at Mysore has both the sections - one for the blind and one for the deaf. There are two blind schools and one school for the deaf having standards V to VII so far as Bangalore is concerned. Hubli has only a blind school of the category, but in Gulbarga there are two schools - one for the blind and one for the deaf.

It was decided to select atleast one school from each of the four places. It was found that the number of children in any single school was not adequate except in Bangalore. Ultimately all the schools in Mysore, Hubli and Gulbarga were selected and only one school at Bangalore was included as it had a large enrolment.

There are four revenue division coinciding with the educational divisions so all of which were represented in the sample. Again, in the formation of the new Karnataka State Ex-Bombay Karnataka, Ex-Hyderabad Karnataka, Ex-Mysore area, Ex-Madras Karnataka and Coorg state were merged. The last two do not have any special school. But the other three are represented in the sample. All the children studying in standards V, VI, VII in the selected schools have been included.

Table: I: The Schools and then class-wise enrolment.

Name of School	CLASS			
	Std V	Std VI	Std VII	Total
1. Mysore School for the Blind	8	6	9	23
2. Hubli School for the Blind	4	5	4	13
3. Gulbarga School for the Blind	4	6	5	15
			Total	51
1. Mysore School for the Deaf	7	6	8	21
2. School for the Deaf Bangalore	18	9	7	34
3. Gulbarga School for the Deaf	6	2	2	10
				65
			Grand Total	116

Tools used for the study

The various instruments for measuring adjustment that have been developed in India are of the check-list type, all items being given equal weightage. Most of these instruments are modelled on Bells Adjustment Inventory.

The Pre-adolescent Adjustment Scale (PAAS) consists of 40 items measuring the adjustment of the child towards home, school, peers, teacher and general aspects. Thurstones method of equal appearing intervals was followed in the construction of the PAAS.

The score of an individual in any area of adjustment is the sum total of the scale values of the items checked by him falling under that area. The score may be positive or negative, a positive score indicating good adjustment and a negative score indicating mal-adjustment.

Validity

The scale has been validated with the ratings of the teachers from 5 schools.

Reliability

Test-retest method with a gap of 3 months had been followed. Product moment correlations were calculated.

Administration of the tool

The researcher personally administered the tool to all children class-wise in the selected schools. The heads of the institutions and the concerned teachers were of great help in the establishment of rapport between the researcher and the students.

Statistical Techniques

Mean, standard deviation and correlation co-efficients by Product Moment Formula are used.

Analysis and Interpretation

The item-wise responses of the students for each area were given scale values as per PAAS. The scores were added for each areas were added to give the over-all adjustment

score of the student. The individual scores were tabulated in groups, area-wise and class-wise separately, and together for the blind and the deaf. The means and standard Deviations were computed for the above to interpret the extent and direction of adjustment and to make comparisons as against the mid-points in the theoretical ranges for each area as per PAAS.

Correlation coefficients were computed for pairs of areas to find out the inter-relationships among them for (a) the blind, (b) the deaf and (c) blind and deaf together.

The data thus analysed and interpreted is presented as follows:

The means and standard deviation for the blind and the deaf in respect of the five areas of adjustment namely, home, school, peers, teacher and general, and overall adjustment has been assed and indicated here.

Home Adjustment

The theoretical range is -10 to + 10 as per PAAS

Table 2: Home Adjustment of blind and Deaf Students

		Blind	Deaf
V	M	7.06	5.38
	SD	2.74	2.92
VI	M	7.53	4.88
	SD	2.62	3.04
VII	M	8.33	3.00
	SD	2.23	2.74

From the above table it can be seen that the means of the blind and the deaf in std V is higher than the theoretical mid-point (+5). This indicates that both have a high level of adjustment. In the case of the blind, none of the groups have a negative score which implies that all of them are fairly well adjusted. The variation is not very high implying a fair distribution of positive scores; among the blind group the variability is less. In standards VI and VII, the blind have still higher means; it may be noted that the means appear to be increasing with increase in standard.

On the other hand, in the case of the deaf the mean tends to decreased with increase in standard which shows that the child finds it more and more difficult to adjust as he grows, though the variability in both the blind and the deaf is not very high.

Adjustment to School

Theoretical range as per PAAS:-10 to +6

Table 3: School Adjustment of Blind and Deaf Students

		Blind	Deaf
V	M	5.13	2.74
	SD	2.09	1.90
VI	M	4.08	0.35
	SD	1.89	2.68
VII	M	3.78	2.00
	SD	1.41	2.02

The blind in all classes have a mean above +3 which is the theoretical mid-point, suggesting a high level of adjustment.

In the case of the deaf, the means for the three class groups is below +3; this shows that no class has a high level of adjustment. In standard VI, the mean is 0.35 indicating a very low level of adjustment, this is due to several maladjusted students in the class.

Secondly, it may be seen that the level of adjustment of the blind decreases almost uniformly as the students proceed to the higher class. In the case of the deaf the mean of the group in standard VII is less than that in standard V.

Variability is not high in the case of the blind, but in the case of the deaf, the variability is high both among standard VI and VII students being pronounced in standard VI.

Peer Adjustment

Theoretical range is -10 to +6

Table 4: Adjustment to Peers of Blind and Deaf Students

		Blind	Deaf
V	M	3.87	3.90
	SD	1.45	2.60
VI	M	4.88	3.58
	SD	2.00	2.86
VII	M	4.55	2.29
	SD	2.60	2.97

Means of all classes for both the blind and the deaf are above the theoretical mid-point (+3) except for the deaf in standard VII where it is slightly lower. Whereas all are well adjusted, deaf students of standard VII show average adjustment.

Variability is not very high except among the deaf in standard VII.

Teacher Adjustment

Theoretical range -10 to +6

Table 5: Adjustment to Teacher of Blind and Deaf Students

		Blind	Deaf
V	M	0.81	0.93
	SD	1.29	2.09
VI	M	1.64	0.82
	SD.	1.66	2.18
VII	M	1.66	0.94
	SD	0.70	2.99

Among all groups, the means are far below the theoretical mid-point (+3) suggesting a very low level of adjustment. However, no group has a negative mean.

This shows that the class as a whole is not maladjusted, though there are a few maladjusted individuals.

Variability is also considerably high in almost all cases except in respect of the blind in standard VII.

General Adjustment

Theoretical range is -6 to +6

Table 6: General Adjustment of Blind and Deaf Students

		Blind	Deaf
Std V	M	6.00	2.29
	SD	2.38	2.17
Std VI	M	5.27	1.17
	SD	1.55	1.92
Std VII	M	5.33	1.88
	SD	1.29	3.16

The above table indicates that all the groups are adjusted; the blind show a higher level of adjustment since their means are much above the theoretical mid-point (+3). The deaf however are all below the theoretical mid-point indicating that there is average adjustment.

Variability is low in the case of the blind in relation to their mean whereas variability is high in the case of the deaf, in relation to their mean.

Overall Adjustment

Moreover all aspects of adjustment are considered together. Theoretical range is -46 to +34

Table 7: Overall Adjustment of the Blind and Deaf students

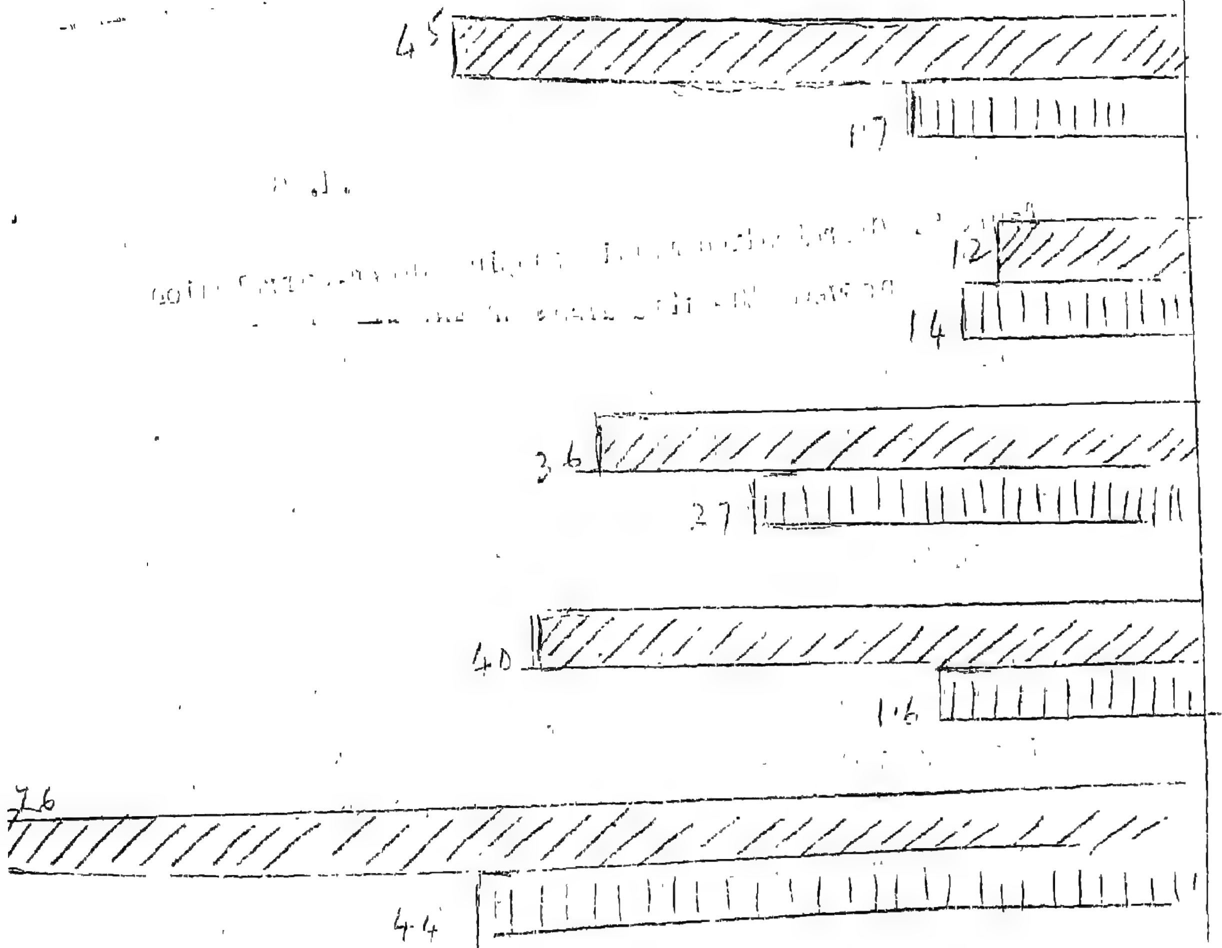
		Blind	Deaf
V	M	20.87	12.71
	SD	3.16	9.62
VI	M	23.352	10.94
	SD	4.58	2.18
VII	M	22.44	10.76
	SD	4.70	8.77

From the addition of scores in all the areas, we get the over-all score for adjustment. The mean scores of standards V, VI and VII for the blind indicate clearly that they are much above the theoretical mid-point (+17). It can be inferred that the blind are on the whole highly adjusted.

Since the deaf, on the contrary show consistently lower means in each of the three standards though positive; it is concluded that they too are adjusted but at a lower level.

Variability is not very high except in the case of the deaf in standards V and VII.

Graph Showing Mean Scores of the Blind and the Deaf in the five areas of Adjustment



<u>Interpretation</u>

Blind 1) Adjustment levels of the Blind are higher than those of the Deaf except in Adjustment to 'teacher'.

Deaf 2) Both have highest Scores in Adjustment to 'home' and the lowest in Adjustment to the 'teacher'.

	Home	School	Peer	Teacher	General
Home		0.91	0.91	0.61	0.94
School			0.99	0.91	0.99
Peer				0.92	0.99
Teacher					0.87
General					

The matrix indicates very high correlations of 0.87 and above in all cases except between 'home' and 'teacher' where it is 0.61 which is also fairly high. All correlations being positive and high we may infer that the distribution patterns are similar to a very great extent. Adjustment of individuals does not very considerably from area to area.

Hence the null hypothesis has been rejected and the alternate hypothesis namely there is a high inter-relationship between adjustment levels in the five areas has been accepted.

Table 9: Corrleation matrix showing inter-correlation between the five areas of adjustment of the Deaf (n = 65)

	Home	School	Peer	Teacher	General
Home		0.89	0.95	0.88	0.90
School			0.98	0.99	0.99
Peer				0.97	0.98
Teacher					0.99
General					

All correlations are very high (0.88 and above) which means that there is little variation in the levels of adjustments of individuals from one area to another.

Hence the null hypothesis has been rejected and the alternate hypothesis namely there is a high inter-relationship between adjustment levels in the five areas has been accepted.

Table 10: Correlation matrix showing inter-correlation between the five areas of adjustment in the Blind and Deaf (n = 116)

	Home	School	Peer	Teacher	General
Home		0.90	0.93	0.77	0.91
School			0.99	0.97	0.99
Peer				0.95	0.99
Teacher					0.95
General					

All correlations are higher than 0.90 except in the inter-relationship between adjustment to 'home' and 'teacher' where it is 0.77 which is also considerably high. This indicates that, in general, students do not vary much in their adjustment in different areas. This was also revealed by the correlational analyses of the blind and deaf students taken separately.

Hence the null hypothesis has been rejected and the alternate hypothesis namely there is a high inter-relationship between adjustment levels in the five areas has been accepted.

Summary and Findings

The study is representative of the revenue/ educational divisions in Karnataka covering only the blind and the deaf students of stds. V to VII in Special Schools in Karnataka.

The objectives were:

1) to find out the extent of adjustment of the blind and deaf students in relation to the five familiar areas namely home, school, peer, teacher and general.

2) to find out whether students in different standards vary in their adjustment levels and,

3) to find out whether the blind and deaf vary in their adjustment.

4) to find out the extent of inter-relationships among adjustments in the five areas, considered pair-wise.

The data was collected personally by the researcher using the standardised tool namely Pre-adolescent Adjustment Scale of Udai Pareek and Venkateswar Rao which has high validity and reliability.

From the analysis and interpretation of the data the following broad conclusions emerge:

1) The levels of adjustment of the blind in all areas is generally higher than the levels of adjustment of the deaf; but both the blind and deaf have positive adjustments and no group is maladjusted.

2) There is a very high inter-relationship between adjustment levels of pairs in all the five areas for the blind and the deaf taken separately or together.

3) Standard-wise, the adjustment level does not increase or decrease significantly except in one or two cases.

Implications for Education

1) Since the adjustment of both the blind and deaf towards the 'teacher' is low as compared to their adjustment in other areas, it is necessary that properly trained teachers with a sympathetic attitude towards the disabled have to be provided in schools.

2) As the blind and deaf students show positive adjustment in each of the five areas, the general impression that the disabled are maladjusted needs to be changed for this, concerted effort needs to be taken by the government and other organisations.

3) Since the adjustment levels of the deaf is comparatively very low as compared to that of the blind, greater attention for better adjustment, needs to be paid in special schools for the deaf.

4) Since the study was conducted with the limitations of a small sample of 51 blind and 65 deaf students, the findings of the study need to be tested and validated by further research in the area of adjustment.

The present study may be considered as merely an exploratory one.

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2.2.0 - Teaching Geography to ~~the~~ Blind

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Abstract

Geography, a study of the earths surface can best be studied through maps, diagrams and other visual aids. The skill of map reading is essential to understand geography aid to develop a special relations. Since blind students cannot take advantage, Braille maps can be used. Individual guidance is required and cannot be provided by the teacher, programmed learning enables the blind pupils to read maps and develop related concepts. Programmed learning has been used to acquaint such students with the political map of Maharashtra. The results are slow but encouraging by writing suitable programmes in geography, the blind can be made aware of the world they live in.

Teaching Geography to the Blind

Geography as a Subject

Geography to a major subject in the school curriculum between Std. III and Std.X. It is a compulsory subject and the reasons for its study are obvious; it will teach a content of connected facts, interesting, significant and culturally valuable. It will suggest the world view, upon the educational value of which we may all agree. It will lend accuracy and reality to ideas of other people and other parts of the world, so that the world view shall be enlivened by a realistic appreciation of other lands (Briault and Shave, 1962). The study of geography is a profitable one for children not so much because it prepares them for this or that but because it can provide them with stimulating material having immediate significance and because it offers opportunities for keen intellectual exercise in the pursuit of the significant relationships between the various parts of the findings (Gopsill, 1958). Childrens' intellectual aptitude is developed by geography as it involves observation, memory, imagination, judgement and reasoning (Tulippe, 1963).

The chief aim in teaching geography is not information but ability to think geographically. In other words, geography is not a subject in which we merely try to remember where is what but in which a systematic effort is made to draw together all the facts about a place. Such an integrating function of the subject enables one to examine relationships between various features e.g. climate and agriculture, industry and transport etc. At a higher level, one may study such relationships at different places and thus understand distribution of such phenomena in the world.

The study of geography, therefore, embraces all

the phenomena of the earth's surface and the vast scope of its subject matter presents one of the most difficult of all the problems of school instruction (Welpton, 1923). The subject is best studied by direct experience through field-work. However, there is a limit to the amount of field work essentially from two aspects: time and finance. Geography is hence studied indirectly by having it presented to our imagination and our forming of mental pictures from such material. To serve this purpose, the unique tool of geography viz. the map (and now serial photographs and landsat imagery) are used. Travel accounts, pictures, photographs are other sources of indirect information.

How the Child Learns Geography

The child begins to learn geographical relationships in the immediate vicinity by experience while those in distant environment are studied through maps. The study of maps is influenced largely by the concepts the child forms. These concepts of space change and get matured with advancing age. The earliest conceptualisations are topological i.e. those like proximity and separation. These are followed by notions of continuity of lines and surfaces. The child's ability to co-ordinate relationships emerges as he carries out actions in or on his environment. Organisation of space in two or three dimensional frame is the outcome of a long series of experiences involving both perception and action. It involves a kind of coming together of notions of relations that are internal to each object or pattern, Euclidian relations established between numbers of objects and pattern together with certain notions of perspective (Piaget and Inhelder, 1956).

But to understand geographical relationships, conceptualisation of space and proper perspective alone does not help.

Attitudes of the children towards people of their own country and foreigners also builds up their images of geography (Piaget and Wail, 1951). The child's ability to attain concepts and even percept depends on his general stage of development and upon his particular experiences with visual material (Veness, 1972). A child may be able to identify objects from two dimensional representations but may not be able to interpret a series and in fact may not see the scene as a whole and this limitation influences the understanding of geography. The formation of geographical concepts is closely associated with the development of an appropriate vocabulary. Geographical terms are presented to children through their own experience through visual stimuli (Milburn, 1972).

The Difficulty of Teaching Geography to The Blind

The difficulty in teaching geography to the blind is now obvious. The visual stimuli cannot be made use of in the development of concepts. Mapreading, therefore, is almost absent and diagrams which aid comprehension of concepts cannot be used. Experiences become restricted and concepts which have denotative meanings i.e. literal meanings that make it possible for the members of a discipline to communicate with each other are rather difficult to form.

In such a situation, Braille maps can, of course, be of some help. But while a teacher in a normal class finds no difficulty in explaining a map to the students at the same time, interpreting Braille maps simultaneously for all students could pose a few problems. The basic concepts like scale, orientation may not have been formed. Individual attention during the slow process of learning

with the maps is not always possible. It has been possible to present information on co-ordinates which can identify points on the map cutaneously i.e. through the skin (Von Haller Gilmer, 1970) but then the problem, particularly in our country is of resources. In such a situation does it mean that a large community of students should be deprived of knowing a subject of immense utility only because complete aid in the formation of concepts in the subject cannot be provided?

An Experiment to Solve the Difficulty

An experiment carried out by the author appears to make the answer to the question above negative. The experiment consisted of acquainting a blind student with the political map of Maharashtra through programmed learning.

The student was completely unaware of the location of Maharashtra, its neighbours etc. Verbal description on this aspect of geography failed to make an impression on him as he continued to ask questions, all apparently reflecting his confusion. With the help of some material, I constructed a Braille map of Maharashtra showing all that I wanted him to know and drew a programme given below. (In brackets are the instructions he had to follow.) The student's curiosity to learn was also an important asset.

Frames	Responses
1. (Feel the map with your fingers) The map shows Maharashtra. The map presents ..... units of Maharashtra	Administrative
2. (Feel the map with your fingers again) Maharashtra is a state. The next lower unit of administration is the	district
3. (Read the names of the districts. Note them down.) The total number of districts in Maharashtra is	twenty six

Frames	Responses
4. (Move your fingers to find out the top of the map.) In a map, the top indicates north. (Read the name.) Above Maharashtra is	Gujarat
......., therefore, lies north of Maharashtra.	Gujarat
5. Move your fingers in the northern parts of the map to read the name you found in the previous step. Now shift your fingers slightly to the right. Read the name.) .... is the other state north of Maharashtra.	Madhya Pradesh
6. (Move your fingers to the bottom of the map. Read the name.)	
The south is shown towards the bottom of the map.......... is below Maharashtra.	Goa
.... lies south of Maharashtra ..	Goa
7. (Place again your fingers at what you had read in the previous step. Move them towards the right.)	
Another state bordering Maharashtra in the south is	Karnataka
8. In a map the right shows the east. (Move your fingers to the rightmost corn . Read the nam)	
Maharashtra is bordered by ..... in the east.	Madhya Pradesh
9. In a map to the left is the west. (Move your fingers to the left is the west. (Move your fingers to the left. Read the name.)	
To the west of Maharashtra lies	the Arabian Sea
10* (Feel the second figure and recognise the four directions.)	
The direction midway between the north and the east is southeast. Similarly between the south and the east is southeast. The direction between the south and the west is	Southwest
The direction between the north and the west is	northwest
(Repeat the names of all directions.)	
11. (Refer again to the map. Locate the south-east. Read the name.) Southeast of Maharashtra is	Andhra Pradesh

*This step became necessary as the student was unaware of these directions.

Frames	Responses
12. (Read the name Bombay with your righthand finger. Place a finger of the left hand at that point. Move the fingers of the right hand to different corners of the map.) Did you feel you had to move your fingers much to the right to reach the extreme eastern corner of Maharashtra?	Yes
Did you find that your righthand fingers moved away from the left hand finger? ...	Yes
13. When your right hand fingers moved to the right, they moved towards the	east
14. Since they moved away from the left hand finger, it means the left hand finger was in the left margins of the map.	
In other words, it showed a place in the ...... area of the state.	Western
That is ..... lies in the western parts of the state.	Bombay

Observations:

The observations of the experiment were:

(A) The student who was totally unfamilar with directions on the map now knew something of the same.

(B) The student had also offered history. Some of his doubts such as the reasons why Europeans had established their colonies first on the coast became clear. He recognised that accessibility formed a major factor in the early colonisation of the Europeans. Though unable to grasp completely, he realised that there exists a spatial point of view and certain phenomena are better explained in terms of space.

(C) The student formed certain concepts about the size and shape of Maharashtra. He could not, however, mark the difference in the sizes of the state and of the districsts. This situation arose for (i) the map was not drawn to scale and (ii) the state boundary and district boundaries had the same feel. Two different types of lines with varying tactile surfaces on a well drawn map will solve the problem.

(D) The student was under the impression that a particular state borders another state only on one side. Madhya Pradesh, he felt, lay only in the north. He found it difficult to understand how Madhya Pradesh could also lie to the east of Maharashtra.

(E) The student appeared to be in confusion as to how two states bordered Maharashtra on one side. He thought that on one side there could be only one state. That both Goa and Karnataka formed southern boundaries or Gujarat and Madhya Pradesh both bordered Maharashtra in the north, was at the first instance rather confusing to him.

(F) The student found it difficult to grasp ideas like a certain city being in an extreme corner of a state because he could not view or in this case, touch, the state as a whole. His contact with the map was only through a few fingers and thus he could not appreciate ideas such as the eccentric location of the capital in Maharashtra.

The last three observations reveal what has been referred to as the problem of part-observation and incomplete ideas which assume great importance in the blind child's acquisition of knowledge (lowenfeld, 1950). This is obviously because the sense of touch is local.

The results of the experiment were very encouraging though they were achieved very slowly. The student found a new point of view to explain some phenomena. He had absorbed some new ideas such as the distribution of places in space. It was heartening to note that on a map of India the student himself could explain why the Aryans or the Muslims first came to the Punjab and then penetrated towards Bengal while in case of the British it was just the reverse.

The experiment was only a small step. The map that had been prepared was of a crude nature. No experiments were or could be carried to measure, quantitatively, the results and evaluate and compare concepts before and after introducing the map. The programme developed did not rigidly follow the rules of programmed learning as mentioned by Klaus (Klaus, 1961). An improved programme will benefit the student as it will remove the difficulties faced by him. A joint effort of geographers who can furnish the content, of educationists who can suggest suitable methods of teaching and improve upon such techniques like programmed learning, of psychologists who can provide means to get insight of a problem and of all those who are engaged in the teaching of the blind will eliminate the difficulties in learning Geography. Programmed learning books on Geography supplemented with maps and other diagrams in the Braille would be an extremely useful aid for the blind in learning Geography providing them with a spatial point of view. They will satisfy the educational and personal needs of the blind particularly at a time when academic opportunities and expectations are being expanded (Gulliford, 1971). True is that such a point of view will be limited but then it will help them to understand better the world the blind live in.

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(Acknowledgement: Shri Vasant Hegde but for whose enthusiasm and help I would not have been able to carry out the experiment.)

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2.3.0 THE TEACHING OF SCIENCE TO THE BLIND

By

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ABSTRACT

The purpose of teaching of Science to the blind is to give a clear understanding of the environment and to enable them to speak an educated language. Attempts have been made to make our Science teaching more interesting with newly available materials and special devices. Our major difficulties are probably;

1) the lack of efficient communication of information other than by word of mouth teaching;

2) need for finding outways and means of creating and stimulating interest in the subject; and

3) the need for arranging experiments by pupils in ways which are fully comprehensible to the blind.

Text books are usually only a partial solution as far as the first problem is concerned. Interested pupils suffer from the fact that there is a shortage of scientific literature (of a general nature) available to the blind. The use of embossed diagrams give the clear understanding about the topic.

The problem of finding the position of the level of a liquid in a measuring cylinder which occurs quite often in Physics and Chemistry justifies the introduction of an apparatus known as "audible measuring cylinders". It is a combination of ordinary embossed measuring cylinders and battery and buzzer. The experiments consisting of weighing and accurate temperature reading are conducted with the help of a modified thermometer and spring balance.

We have found that blind pupil can be taught sufficient Physics, Chemistry and Life Sciences to obtain a certificate of High School or Higher Secondary Board Examinations of N.C.E.R.T. courses with some modification in practical examinations.

Introduction:

The emphasis in this country has traditionally been on Arts and vocational subjects, the limitation of these aims is no longer acceptable. Physiotherapy had become a valuable career for blind men and women and for this a knowledge of basic science is required. No one, except teachers of the blind feel comfortable about the argument that it might be wise for the blind to know enough about Science to enable them to speak the language of educated people. When I was appointed as Science Teacher in 1976 all boys took General Science upto High School level. The boys in fact did a good deal of practical work under the guidance of teachers; results were encouraging in that all the boys passed. The question now is whether it is possible for the blind pupils to study an advanced level of Physics, Chemistry and Life Sciences for which practical examinations are rightly required. By teaching theory and modifying some apparatus and substituting the sight factor by three things i.e. sense of touch, smell and hearing. With the help of tactile sense, the teaching of Life Sciences has become possible. With the help of Olfactory sense the teaching of both the theoritical and practical aspects of Chemistry is possible and auditory sense helps us in modifying apparatus for experiments in Physics. We have become convinced that a study of Science is completely viable for blind students at least at secondary school level and that they have a full right to study the subject. It is harder for them, generally, to

gain experience of phenomenon and their curiosity may not always be so easily whetted. But these two connected facts make it more incumbant upon teachers to stir their curiosity and to help them to gain that experience which will be a factor in giving them the self confidence which they so badly need. The environment is hostile to the blind; the more they can master it by understanding it, the happier they are likely to be. Blind pupils must use the other four senses, which are likely to give more fragmented impressions. In learning Science, the experience may be different from that of a sighted person. For example, experience, of light must be presented through sound; provided the student is able to understand the principles and he realises that this oral experience is different from the visual experience of a sighted person, the change of medium does not matter. It is understanding that matters in learning Science, not aesthetic appreciation.

Any means may be employed to help understanding; the real is better than the symbolical, e.g. in Biology the living body, growing plants and clay models have their place, though blind students must be taught to interpret them, to magnify dimensions and to realise difference of texture. Sometimes a model can show principles better than the real object because irrelevance can be discarded. It is essential for blind students to be trained in interpretation of embossed drawing and for teachers to understand what fingers can interpret.

It might be thought that much special apparatus is required to teach Science to the blind. We believed so at first, but we see clearly now that it is for several reasons better that the blind student should use normal apparatus with braille scales fixed, if needed [illegible] blind students

want to work with sighted pupils, the former should be able to use the latter's apparatus commercial apparatus is vastly cheaper and much more quickly available than specially produced items. What is really needed is a resourceful and imaginative teacher with the patience to move at a slower pace which is essential even for clever blind pupils with aptitude; The greater the opportunity for discovery the better. The teacher can at least see that pupil does as much for himself as possible and that he has the fun of taking for himself the final step to the solution.

THE TEACHING OF SCIENCE AT AHMADI SCHOOL FOR THE BLIND, ALIGARH

Science was first introduced as a General Science course upto the secondary level, for which no practical examination was required. But it was not enough for providing good background knowledge of the environment. A more profound scientific knowledge was required. Higher Science was introduced in the School as an examination subject upto High School, for which a practical examination was required. We were compelled to concentrate our teaching efforts on all three i.e. Physics, Chemistry and Life Sciences as independent subjects. Physics was chosen as the subject on which we would place the main emphasis chiefly because it appeared that it would be possible to adapt a larger proportion of the usual practical work so as to enable participation by the blind in this branch of science rather than the others. We now teach Physics, Chemistry and Life Sciences to the Secondary and Higher Secondary levels. We regretted that we paid less emphasis to the other branches of science but we do teach as much Biology and Chemistry

as the syllabi permit. Some of the difficulties in teaching Biology are realised- we cannot use the microscope or micro-projector and the many excellent biological diagrams, nor can we carry out dissections. However, we use clay models of animal organs and organ systems, parts of plants, skeletons stuffed animals and the pupils' own body to help illustrate teaching. Much of the ordinary school, chemistry practicals rely upon visual observations and use of measuring devices requiring vision. While we can overcome some of the consequent problems, it is still not possible to indicate a large number of chemical reactions. By modifying, to some extent, the usual introductory syllabus, however, it does seem possible to introduce some interest in and understanding of fundamental chemistry using small identification, exo-thermic and endothermic reactions, audible effects and other means of indications comprehensible to the blind and thus introduce at least partial pupil participation. We have found that a blind pupil can be taught sufficient Chemistry to obtain a certificate of a High School or Higher Secondary Board Examination with some modification in practical examinations. The factor is obvious danger in Chemistry practical of use of heating in most experiments and the handling of fairly dangerous chemicals and largely because of this, there are few uses of a Chemistry qualifications in pupil's future career.

In our attempt to try to make our science teaching more interesting we have been greatly helped, in recent years, by newly available materials and newly developed special devices; naturally, problems arise when one tries to teach any subject to persons whose vision is poor. Science teaching renders a few of the general difficulties more acute and adds a few of its own - specially in the field of practical work and demonstrations. Our major

difficulties are probably:

1. The lack of efficient communication of information other than by word of mouth teaching.
2. The paucity of ways and means to create and stimulate interest in the subject.
3. The inability to arrange pupil experiments in ways which are fully comprehensible to the blind.

The objectives in the course of instructions in experimental science for blind students may be briefly summarised as follows:

1. By means of specially designed apparatus to widen the field of meaningful perceptual contact with the external world.
2. To provide participation in the general heritage of human thought concerning the nature of physical and biological phenomenon and in particular the major concepts of Science which have become such potent instruments in the structure of modern thought.
3. To enhance manipulative skills in the operation of scientific instruments and disciplined thought in the use of methods of scientific investigation with an eye to developing potentialities for gainful occupations.
4. To enable blind students to keep abreast of the lines in matters of scientific interest and to provide some understanding of technical appliances in common use.
5. To these objectives one must add that of preparing the students to pass certain public examinations at present needed to open the door to certain professions and to the Universities.

APPARATUS

Our problem is to provide the blind students with apparatus wherewith he may be able to do experimental work associated with the course of instructions in Science.

Requirements for the design of such apparatus area :-

1. Provision of means to enable the blind students to observe the natural phenomenon which the apparatus intend to demonstrate.

2. It should be designed in such a way that the blind student can learn to operate the apparatus himself.

3. Since we are concerned herewith teaching apparatus, to aim at a design in which both form and function can be comprehended by the student.

The first requirement is mainly that of translating the visual signals of the conventional apparatus into signals perceptually acceptable to the blind. This entails, for the most part, furnishing the apparatus with devices which give audible and tactile information concerning those relevant observations which related to the experimental exercise.

Occasionally, particularly in the Chemistry course, one can make use of the olfactory sense and of gestatory sense for communicating the desired information and, in the rare cases of those who are both blind and deaf, one can use signals provided by a mechanical vibrator.

At this stage I wish to give some consideration to the operation of translation of signals in order to assess the potentialities and limitations in the communication of information. Let us consider a definite example, we have an audible photo-electric cell which emits sharp sound when

the photo cell is exposed to light and such that when the intensity of light is increased the frequency of the sound waves increases in proportions. It has proved very useful in experiments on light in physics.

Among the general methods which are available for achieving these goals we may list the following :-

- the use of embosed diagrams and three dimensional models.
- audification of apparatus
- instrument scales
- the use of probe for explaining parts inaccessible to fingers
- the use of photo-electric cell together with buzzers, bells and needless.
- aids for drawing graphs.

Embossed diagrams : We have learnt by experience that such students, with the help of suitable diagrams accompanied by the teachers explanation, will have a clear understanding about a new piece of apparatus. We aim, therefore, by means of this line diagram and our verbal explanation of it, at providing the student with a mental scheme concerning the nature of the parts of the new apparatus and more particularly their relative arrangement in space. For purposes of class teaching one requires a technique of making palpable diagrams which should satisfy the following requirements :

1. It should be possible for the teacher to make the diagrams rapidly in class. That is we seek a method which can serve a similar function as does the black board and chalk in normal teaching work.

2. We must, therefore, be able to make a number of copies simultaneously as to provide one to every student.

3. The embossed diagram be reasonably permanent so as to be retained by the student for future reference.

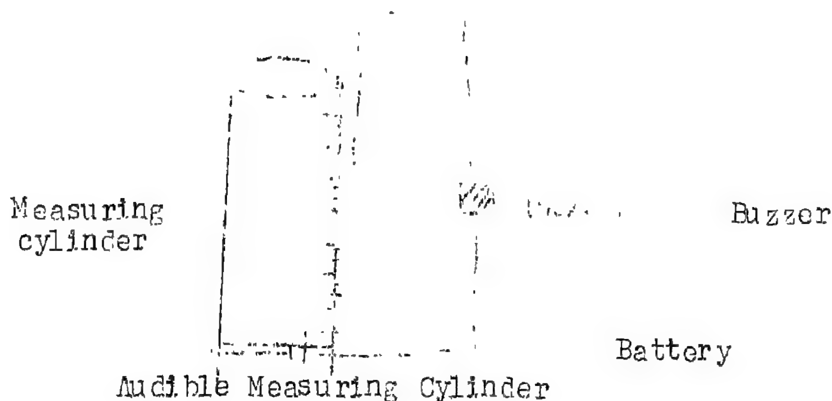
4. They should be inexpensive.

There are special cases in which it is very difficult to convey to the blind student the relevant information by means of a line drawing on a plane surface. This is particularly so where the matter to be explained involves the understanding of three dimensional relationships. This point arose when I was asked to make a diagram of seasons of the year in relation to the inclination of the axis of rotation of the earth to the ecliptic. An embossed diagram copied from the conventional diagram of the seasons given in atlases failed to convey the desired explanation to blind students. With the three dimensional model, the matter in question could be successfully explained.

Audification of the Apparatus : It is the process of modifying an instrument so that the information which is conventionally given by seeing something is, instead, given by hearing it. In other words, it is the process of translating conventional visual signals into auditory signals. In operating the instrument the blind student is asking a question and the instrument answers by making a noise or not making a noise or making a different noise. Although it is not essential that he should understand the mechanism by which the noise is produced it is preferable that he should do so in connection with a course of instructions in Science.

Keeping in view the above concept, we have designed an audible measuring cylinder. The problem of knowing the exact volume of the liquid can be solved by this apparatus; It is a very simple apparatus; It consists of an ordinary plastic measuring cylinder with an embossed scale on the side wall. Taking a wooden stick, cut it in such a way that it looks like a forceps. Insert this wooden forceps in the measuring cylinder in such a way that one end of the forceps should be outside on the embossed scale and the other one inside the cylinder parallel to the outside pointer. Take a battery and buzzer, connect one end of the battery at the bottom of the measuring cylinder by inserting a nail, so that it touch the liquid. The other end of the battery will go through the buzzer to the pointer of the wooden forceps which is inside the measuring cylinder, so that it can touch the layer of the liquid. Once the battery is on and we slowly lower down the wooden forceps, with the two pointer outside and inside the wall of the cylinder. The outside pointer runs along the embossed scale. By slowly lowering down the wooden forceps, a time will come when the inner pointer touches the layer of the liquid and the circuit will be complete. The moment the circuit is complete the buzzer or bell will go off. Hearing the sound, the blind student can stop the pointer and read the scale on the basis of pointer which is at the embossed scale.

In most applications considered here the sound signal is required to indicate a point of contact.



Audible Measuring Cylinder

Thermometry : We use a commercial instrument known as Rototherm with an extended printed and magnified centigrade scale. This instrument is in the shape of circular dial with a pointer which is very sensitive and moves with a slight change in temperature. It is very easy to read or understand because it resembles a braille watch. With this the daily room temperature can be easily noted.

Weighing : The class work in practical experimental science both, in Physics and Chemistry, may involve at times a number of weighing operations for each experiment. The practical requirement of a weighing device is that :

(a) it should be able to weigh objects in the range of 1-500 gms with an accuracy of about 1 part in 1000; (b) the weighing operation must be rapid.

It is possible to modify the conventional laboratory beam balance for use by blind students. It requires atleast 10 minutes to weigh an object accurately. Some experiments may involve many weighing operations. In our classes which are of 40 minutes duration each day, include both theory and practical work, the use of the conventional beam balance with a set of weights would be too time consuming. With the help of spring balance a sufficiently precise weighing can be done by the blind student in about one minute. Two models are in use - one with relatively heavy spring with a range upto 500 gms and senstitivity 0.5 gm, and the other with a very light spring with a range 1-5 gm with a senstivity of 5 mg.

The aim of Science is to increase the understanding of natural phenomenon. It may be concluded by stating a very general principle - namely, that there is always a way to do it - or at least shall almost always. And having found one way there is nearly always round the corner a better and simpler way. It is my earnest hope that readers of this paper may be stimulated to find these better and simpler ways.

A C K N O W L E D G E M E N T

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2.4.0 EDUCATIONAL REHABILITATION FOR THE VISUALLY HANDICAPPED:

BY

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A B S T R A C T

Education means preparing a child for "Complete living" by helping the manifestation of "perfection" already within "man" and the "harmonious development" of all the aspects.

This idea applies also to visually handicapped children. The educators of visually impaired children should explore every possible way to make them enjoy a normal social life as far as possible and to impart the knowledge and culture to them which would fit them for all phases of life.

The visually handicapped children are found to be educationally retarded in comparison to their seeing counterparts - due to various reasons, to eliminate this condition the educators should chalk out the educational programmes in such a way that the client's concerned may overcome the limitations in the best possible manner.

Learning-readiness depends largely upon the education and training he receives from his parents during his pre-school days. It is, therefore, necessary to have "proper parental education" for proper career-planning of the

visually handicapped child".

There should be a proper liaison between the teacher taught and the parents - as the need of the individual client's are different.

The curriculum should also be tailor-made on it should be in accordance with the need of the client; special emphasis should be given for specialised subjects. The teaching-aids should be modern, up-todate informative. So that, the students get pleasure and interest in learning.

The teacher must be resourceful, enthusiastic and knowledgeable as a great degree of achievement of the client depends on him.

Counselling and guidance services, medical and health check-ups, P.T. and mobility training, recreational and social skill activities should be developed through the full participation and equality of the society.

Special incentives, equipment-banks educational facilities etc. should be developed to keep up the standard of education.

Socialisation, integration and educational rehabilitation etc. are only possible through the maximum involvement of the client, community, government, social service clubs etc.

Let us attempt on the eve of this International Year of the Disabled Persons (IYDP) - 1981 - for total upliftment and rehabilitation in the area of education of the visually handicapped persons.

Before starting this article I would like to define What is 'Education' and what is Rehabilitation?

'EDUCO' is a Greek Word, it means 'to nourish' and 'Education' means 'To nourish the Soul'; 'Rehabilitation' means 'Restoration'. So "Educational Rehabilitation' means to nourish the soul by restoring the remaining potentialities". There is a nice defination by Mary Switzer -

"Rehabilitation is a Bridge, spanning the Gap Between uselessness and usefulness, between hopelessness and hopefulness, between despair and happiness".

Education aims at preparing a child for 'Complete Living' by helping the manifestation of 'Perfection' already within 'Man' and the 'Harmonious Development' of all the aspects vital, physical, psychological, emotional, spiritual and cultural. A child should be well adjusted to himself and to his environment, independent and self-supporting, dependable and socialised as a result of his education.

This idea applies also to visually handicapped children. The educator of visually impaired children should explore every possible ways to make them enjoy a normal social life as far as practicable and to impart that knowledge and culture to them which would fit them for all phases of life.

The visually handicapped children are found to be educationally retarded in comparison to their seeing counterparts indent points by atleast two or three years. It is due to:

a) Low sensory input.

b) Low level of information.

c) Restricted and crippled communication.

d) Restricted opportunity for orientation and mobility.

e) Several psychological and social complications resulting from the loss of vision and so on.

Obviously, all these tend to make a visually handicapped child's standard somewhat behind the normal. In most cases, this can be recovered through proper education and training.

Low or restricted sensory input as a result of the loss of or impairment in vision, affecting an individual's behaviour and pattern of response to the world around him.

Low informational level as vision is one of the most important channels of information which here is absent or limited in the client.

Poor imitation, which is one of the most important and significant bases of learning and as such, this fact results in -

The delayed process of learning, lack of the geographical sense of direction, distance and space.

Crippled-communication since vision appears to be the only extensive way of establishing indirect communication with the world around us. I say, 'Indirect way of communication' with a view to distinquish it from touch which is the direct way of communication.

Lack of sufficient idea of the circumstantial world, resulting in:

Lack in the developing of normal vocabulary giving rise to

Verbalism as an offshoot.

Lack of proper mobility, restricting the field of exploration, crippling the scope of learning, development of several mental complexes, like inferiority complex, exhibitionism, sedentrainess and so on, hindering the easy way of learning to the greatest extent.

Resulting form the above facts, social retardations occurs.

The inherent and the true tune of education is to be able to stand one's own feet in all respects and especially economically. For the sighted children there are ample chances to strengthen their informational level as their education is visually-oriented, regarding job opportunities sighted children are fortunate enough.

So the educational pattern of the blind should make in such a way that they can compensate their backwardness as far as possible by suing the remaining senses to a maximum extent. Originally the pattern of education for the blind are divided into three categories:

1. Segregated - Type (Residential - School).
2. Integrated - Type (Open Education).
3. Experimental - Type.

The world as whole is moving towards integration and in some countries, the visually handicapped children are compelled to attend regular schools if they are found otherwise normal. Not to speak of the other countries we are experiencing a tremendous note of change here in India also. 'Integration' as such, is now our national policy.

The introduction of Braille Press on Regional basis tends to solve the problem relating the availability of text-books. Teachers' Training Programme has been installed in different regions to produce qualified teachers with a view to raising the standard of teaching of the visually handicapped, the basic-braille appliances are now manufactured in our country to meet the want of equipment. Training Centre for the Instructors' of the blind have been started for integrating the blind in the society.

'Integration', itself, is the most important influence in bringing about understanding and experience of blind people.

'Integrated-Plan' for the Education of the Blind.

1. Resource-teacher and Resource Room.
2. Mobile (itinerant) & Home Teaching Plan
3. Rehabilitation Teaching Plan
4. Specialised teacher

In the 'Resource-room' plan, 4 to 6 blind children from one group are brought together each day into one regular school. Braille-equipments, embossed-maps etc. are the main teaching aids.

In 'Mobile-teaching' plan the blind children will attend their regular schools, where they will be placed directly into the regular classes. A specialised-teacher for the blind will travel between many schools and he will bring materials and aids into the class. Time to time he will hold conferences and inter-disciplinary talks about the progress and the problems of the blind students, with the other general teachers, parents and authorities of the school.

Itinerant teach : is necessary for the Open Education Programme and may be allowed to serve as go-betweens, connecting the school and the pupils at home under the integrated system. The itinerant-teacher, therefore, should have a close contact with the class-teacher and must be well versed in the school subjects.

The Home-teachers are also useful in the field of education and rehabilitation of the Blind. Especially non-school going children and the adult-blind and above all, multiple-handicapped. As such, installation of such a programme is essential.

There are some resource-teachers that is those who are expert in a certain subject or subjects. For operating some special equipments to increase the informational level, special training is needed.

A large part in progressive education for younger children is played by creative, constructive and manupulative activities depending mainly on vision. These must be extensively adapted if they are to be applicable for the visually handicapped especially for blind children. Even for older children education today depends less on oral instruction than formerly, and more on visual exposition through the use of the black-board and other visual aids.

I must also refer to the activities of the National Association for the Blind, whose contribution in the field of both education and rehabilitation is undoubtedly immense's introduction of Nursery Education

for the blind and the effective services rendered by it. Talking Books Studio are two of its many unique projects. Recently, the Association has taken up a Research Programme to conduct researches and investigations into the teaching and other needs and techniques in connection with the education of the blind and the work here is reported to progress steadily. Several institutions also venture to fulfil the aim in the education of the blind and the one for the partially sighted at Dehra Dun run by the Government of India, is unique in our country.

Essential Factors for Educational Rehabilitation:

1. Academic development with learning readiness.
2. Development of communication channel and teaching -aids (low vision aid, audio-visual, audio-tactile etc.)
3. Physical education and mobility.
4. Counselling and Guidance Services to the client and their parents.
5. Class-room confrontation and proper curriculum.
6. Effective follow-up services.

Parental Education:

There should be some systemic programme for parental education. They should be made aware of the special needs of their child and should be taught to consider him first as a 'child' and then his 'handicap'. They should be properly instructed to take the phenomenon of handicap as an accident and not as a curse, so that their attitude may boldly cope with the handicap of their child. They should also have some idea of how to impart

formal and basic training to their blind child who can not imitate through seeing. Thus, the habit of using the toilet properly and that of eating, alongwith correct posture and gesture should be taught to their client patiently by allowing them to feel in certain cases.

This type of parental education should be organised with the help of the social workers. This is a must, if we desire to have better result from school education. Sometimes group-family counselling and Individual Counselling plays a vital role for rehabilitating the blind. The proper qualified and resourceful Counsellor should take initiative in this matter.

Curriculum:

We should remember that school is the focal point of information to the visually handicapped children and so the authority should try as far as possible to impart the information to the students as much as possible. The curriculum of a school should include scientific, technical and cultural activities - which would satisfy all kinds of curiosity. Education also implies all-round development, physically, mentally, emotionally and spiritually. Hence the curriculum should provide opportunity for this sort of balanced and harmonised development in the clients. But there are few schools for the blind which are ornamented with such curriculum.

The heads or the policy formulating bodies should be aware of the needs of the pupil, otherwise betterment is not possible. It is required, therefore, that the heads and atleast two members of the managing committee or the policy formulating body should train personnel in respect of the special needs of the children without sight or

with imparied vision. 'Sheer Philanthropic zeal' is not enough in this field, or it is better to have one good school than a mushroom growth of worthless schools.

Communication Channel:

1. Teaching of Braille.
2. Type-writing, T.V., Cassettee Tape-recorder, Radio, talking book, dictaphone-type-writing etc.
3. Teaching aids and text-books.
4. Teaching of Science, Arithmetic, Geography, etc.
5. Participation in Social functions and festivals etc. for developing the social skills.

Teaching of Braille:

The teaching of Braille should be more scientifically based than it appears at present. It should not be counted as part and parcel of the language class. The client should be prepared to learn Braille reading first and then writing, through the development of the senses of touch, direction, distance, space etc. All the Indian languages originate from Sanskrit, it is the source of all languages. The Government of India has introduced a new Braille-system, which is known as 'Bharati-Braille'. At first the pupil should use and learn Bharati-Braille, then it will not be difficult for them to learn English Braille.

'Open-Education' or Integrated-teaching Plan:

1. Unit-technique of teaching.
2. Co-relational method.
3. Concept-formation through nature-study.
4. Project-method.
5. Heuristic-method.

The use of the teaching aids alongwith the Concept-formation-room wherein the different models of the objective-world are preserved should be compulsory. The models should be three-dimentional and as near to the object they represent as possible. The teacher should try to make text book features illustrative and interesting to the Children without sight.

The quality of a
Resource-Teacher:

1. Academic.
2. Professional
3. Personal.

The teacher of the children should posses all the qualities of a good teacher. It should be noted that a teacher of the blind differs from that of the seeking in degree, but not in kind. The authority should take great care in selecting them. They must fulfil the requisite academic qualifications as those of seeing. As the education of the blind is a special one, greater degree of achievement may be demanded from them.

They must be trained in teaching the children and preferably also, in teaching the seeking, with atleast, three years continuous teaching experience in the school for the seeing. Before appointment the authority should test his teaching ability by putting him into actual class-room confrontation for atleast seven consecutive days.

The authority should not try to exploit the teacher on the basis of dedication or humanism. Special allowances and incentives should be given for drawing good

and resourceful teachers to the blind-welfare field.

The effectiveness of Integrated Education would seem to depend on the factors of amount of vision, age, intelligence, and personality. Integrated Education would be universally more effective than segregated education, it might quite well successed with partially sighted children possessing fairly good vision.

Avoiding all controversy as to whether the Integrated Education or segregated system of education is suitable for the blind, it may be asserted that a system combining the two would better suit the purpose. In this case, the clients in question would be allowed to receive special education under a special stimulation and this would be confined to the elementary grade. They would join the regular school under open education programme to study alongwith their seeing counterparts, in the secondary stages. It is suggested that in the elementary grades integration may hamper the cause of the children who require special environment. Besides, they are to be adjusted to their handicap before they go to attend open education programme.

A decade has gone by since this initial experiment and today integrated education is gaining rapid ground. In Bombay city alone we can report that well over two hundred boys and girls are now studying in schools and colleges, and the movement has also spread to other parts of India. The wide gap which separated the blind child from receiving educational opportunities similar to those of seeing children is now rapidly

narrowing and there is every livelihood that in the years to come integrated education will become an accepted and established channel open to every efficient and intelligent boy and girl who is blind.

Although we cannot claim that the method has been established along ideal lines, we feel that substantial headway has been made for the laying of stronger foundations in the future. Here, briefly, are the milestones which have been reached towards encouraging Integrated Education in India.

C o n c l u s i o n:

In order to effect improvement and implement it is thus necessary that research and investigation programme in teaching technique should be installed with immediate effect to get rid to the traditional methods of teaching the visually handicapped. In this connection on the eve of I.Y.D.I. Programme, it may be brought under a nationalised-way. The betterment and proper implementation of the programme depends on:

1. National Council for Educational Research and Training, for the physically handicapped as well as for the blind.

2. Equipment Bank (for teaching-aids and appliances)

3. National Institute, Model School for Integrated Education (regional basis), for education and training Pre-vocational and vocational guidance and Counselling services, and above all 'Follow-up' services.

In a word, the educational-rehabilitation of the blind should mean to make a client vitally, physically, economically, emotionally, mentally, spiritually and culturally developed, so that he gains a balanced-personality to be socialised and self-supporting, inspite of visual impairment.

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2.5.0 1981 : A YEAR OF VISION AND REVISION

By

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ABSTRACT

Refocussing and re-orienting ourselves is necessary to make a success of education for the blind in this decade. While the usual subjects need not be neglected, the focus for a blind child should be on subjects which will help him to adapt to this own particular society, and to adapt in such a way that he will be an asset rather than a liability...... whether in rural or urban India. Independence techniques, communication skills, responsibility training, leisure time activities are all to be stressed, as also sensory training and the gaining of the fullest gamut of experience as is possible. Home-making is also an art which is not the sole privilege of the sighted. A programme mainly concerning rural blind should contain items of instruction, from local 'instructors' which are relevant and useful in a village. Literacy (or more) should only to ba a PART of their education......and not take up valuable time.

Is life divided into sections? No, I say.
Then why have subjects at school?
Teach living at school,
And living means understanding
And understanding is all.

The 17 year old who wrote the above lines was not really saying that subjects are useless....but that they

serve no purpose when they are introduced without reference to life itself. This seems to be very similar to the problem we face with regard to the education of the blind. Our education system for the blind is so far behind the times that it is by and large unrealistic and merely skims the surface of the problem. New needs are constantly emerging. They have either been ignored, or taken up in a very lukewarm manner.

What poor education we have to offer the blind mainly caters to some of the needs of urban blind. What then of our majority? They are rural folk, often misguidedly put into city residential schools for the blind. What do we make of them? Misfits. They do not fully fit into the pattern of the urban and sophisticated, nor can they ever really fit back into their rural background. Like another 17 year old said 'I consider it essential that the school should change with the body of pupils it contains and with the society in which they must be adapted to live'. How true and how little thought we give to it when considering syllabi, curriculum and all the various 'gimmicks' of a school 'system'! Do we insist that urban children learn farming? Then why do we insist that rural children should be converted into urban masterpieces? Instead of teaching them the dignity of labour, the value of self-employment, the advantages of rural and family projects, we teach them only enough to ruin their chances.....leave them floudering in a sea of unemployment, or unsuitable employment. Instead of teaching a blind child to learn the value of walking alone....we teach him to be dependent and a burden to even the

most patient and willing parents and friends. Instead of teaching him that leisure time is precious and useful, we teach him to sit with his head in his hands, brooding amd meditating over his sad lot. What price education?

Literacy is essential. It is one of several items which lends to the dignity of a person, which helps in daily life and helps a person avoid pitfalls. Another teenager has summed up this aspect by saying, 'After all, a diploma or degree is not the perfect vaccine against stupidity' ; And yet, surprisingly, this is how we still look upon this aspect. Does that piece of paper guarantee that the person will get a job, that he will be satisfied and happy, that it will help his family? What does it guarantee to the majority of India's blind? He may be looked up to in his village as he is 'educated'....but does this guarantee that he is useful? In an urban setting it usually paves the way to very stiff and unpleasant competition and, the higher one goes up the ladder of degree-holding, the worse it gets. Very few blind persons have got to the very top of the academic ladder.....and even there, it has brought disillusionment. Some become very attractive and very impressive figure-heads. But, again I ask, what of our majority?

With careful placement and understanding of the problem, most urban children can be sent to normal school.......i.e. the 'normal' blind child, and not the multiple-handicapped. All that the system requires are resource groups in each area of town....teachers who will see that the child has and knows how to use special equipment, that he has understood his lessons during the

day, and that he learns to utilise his 'spare' time successfully and satisfyingly. The resource teachers will also note the child's aptitudes, inclinations and can later direct him to a suitable vocational guidance centre. Independance must be stressed both at school and at home, and the child must be encouraged in as many of the 'sighted' activities as is possible..... e.g. sweeping, dusting, washing, caring for himself (and perhaps for a younger sister).

In common with their rural brothers, the urban blind can and must cover the following areas:

1. Orientation and Mobility, and Independence techniques.
2. Communication.
3. Sensory Training.
4. Maximum experience.
5. Responsibility training.
6. Leisure-time skills.

1. Orientation and mobility: For all blind children, this must not be considered an 'extra' subject. It is not a mere technique to be taught when the child is old enough to hold a cane. Rather, it involves the child from as early as possible; It teacher a child to move freely and confidently, to relate to space and its surroundings; it involves complicated items such as compass directions, and the whole gamut of daily-living skills, of style and fashion, of movement that is not merely independent, but graceful and acceptable. And it opens one major door into society at large.

2. Communication: Communication is as much a part of our lives as the air we breathe, and as vital. Any breakdown in any of the senses also indicates a partial breakdown

in communication. This, in turn, spells segregation, separation of a section of the population, and this is precisely what we are fighting against.

The eyes have, not for nothing, been called 'the windows of the soul'. From the time a child is born, it learns to communicate. It begins to express hunger, frustration, joy, discomfort.....but much of this communication is on account of visual stimuli. A blind baby, however, needs to depend on his ear and nose perhaps to know if his mother is near. If there is silence and the mother is close by, it is as if the mother is not there at all. A blind baby may 'talk' to and be entertained by radio or record-player sounds for a while, but he learns soon enough that this is no substitute for a human being.

A blind child has to be accepted by a 'sighted' world. He must not just learn to communicate with other blind persons, but with sighted people, and, as far as possible, by sighted standards. He must learn to speak not with the voice of antagonism or hostility, but pleasantly and confidently. Debates, discussion, drama....all of which play a large part for sighted children....can now be seen as decidedly more important to a visually handicapped student.

3. Sensory Training: All good educational systems....e.g. Froebel and Montessori....lay emphasis on learning via the senses; it is not surprising that specially adapted Montessori equipment is being made in India today ...for the use of blind students. The touch, hearing, smell and taste are specially thought of.

Touch: To a blind child, a very important aspect of his life is what he can understand about the world through what

he can feel. He also needs touch in order to learn Braille, Maths, to do science experiments or to 'look' at Geography embossed maps. He learns to use not only his hands, but his body-touch sensations....the ground, the walls, proximity to other persons or things. Still later, using the White cane, which is actually an extension of the index finger, he will learn to 'feel' through this cane, via the finger in order to learn about his surroundings. He also learns to sort and tidy his clothes, to lace his shoes...and even thread a needle.

Hearing: By no means does a blind child have hearing that is 'compensatory' rather, it is through training and necessity that this sense must be sharpened. A blind child must not merely learn to 'listen' to surrounding sounds, lectures, lessons etc. He must use his hearing to locate himself, to guide him and to give himself confidence.

Smell and taste: These are both important to a blind child as he has often to use these in order to identify something of someone.

The Kinesthetic Sense: This 'sense' is connected with what is known as 'muscular memory'......i.e. one often knows when one has walked a certain distance if it is an oft-travelled route. Also, one knows if a pathway is going up-hill or down. Slopes, curves, turns and angles are all indicated to us by this sense. To a blind child, it is important that he is accurate....for he could become completely disoriented and lost if he is not made aware of the functions of this sense. Training the senses, and more

he can feel. He also needs touch in order to learn Braille, Maths, to do science experiments or to 'look' at Geography embossed maps. He learns to use not only his hands, but his body-touch sensations....the ground, the walls, proximity to other persons or things. Still later, using the White cane, which is actually an extension of the index finger, he will learn to 'feel' through this cane, via the finger in order to learn about his surroundings. He also learns to sort and tidy his clothes, to lace his shoes...and even thread a needle.

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particularly this last mentioned is fairly complicated.... and it involved its own specific terminology and requires a great deal of practice.

Very important for 'blind' children is the training of, surprisingly, the sense of sight. The majority of blind children has at least 'light perception'. Many of them have considerably more residual vision.... though they are clinically 'blind'. Many can learn to appreciate colour and the significance of colour. Others can learn to use Braille, yet be taught to use their residual vision when occupied with other tasks. These with mere light perception can be taught to use this perception to guide themselves. There is not just testing equipment to help such children, but also considerable remedial material as well....and the results of such teaching have seemingly 'improved' vision. Actually, all that occurs is that the training has made the blind child more aware.....and not really that the vision itself has improved.

4. Maximum experience: The sense of sight is the only one which can be associated with continuity. One can walk into a room, glance around and take in almost everything in a short while, not so for a blind person. Verbal descriptions are necessary, and sometimes there seems to be no alternative. However, no matter how well a sighted person may describe a station, there can be no comparison with the actual experience.....the smell of diesel or smoke, the heat of the engine, the chug-chugging or rock-rocking movements and the general smell and sounds of a railway are much more enriching. No replicas, unless very realistic, can replace the real thing...the smell and scent of a rose...and even the

the thorns...are far better than the most beautiful plastic flower. Of course, there are things which are next to impossible to convey...must be explained by models or words. The height and grandeur of a Mount Everest, the concept of 'horizon', the delicacy of tiny insects or microscopic beings...all these things can hardly be explained even in verbal terms. Still, as far as is possible, a blind child must be taught about a sighted world. The excitement of a cricket match is conveyed to a blind child as he attends the match or listens to the commentary on the radio. But how many blind children really know the positions on a field, what spin-bowling is, or why a person is given out LBW?

For blind children, the real is always preferable to the artificial or the simulated. But a simulated situation or model is preferable to mere words. However, where we are only able to use words.... then there is no alternative. But we must be careful to try and use words which keep in mind that what one is teaching him is to help him in a sighted world. False or incorrect information may, later on, make him an object of pity or the laughing-stock of his group.

5. Responsibility Training: In no way should sighted persons avoid giving responsibilities to blind children. In fact, if blind children are given certain responsibilities in the school, they learn to assume leadership, they learn how to command and be commanded, to organise and be organised. They can learn to shoulder duties...both pleasant and unpleasant, to help train younger children.....in short, to develop and respect themselves. We must forget

the old tenets of education which called it 'preparing for life' and believe, a 14-year old essayist, 'I am not preparing for life. I am alive now.'

It would do all teachers, and more so those who teach the blind, good if they gave the students more chance to speak and took more opportunity to listen. It is truly well said that God very deliberately gave us two ears, but only one tongue. But as teachers, we often forget this. Does it demean us in any way if we listen, approve and even enact the often very sensible ideas of blind children?

6. Leisure-time activities: Small children occupy their time in imaginary games and thus pass their time if they do not have anything specific to do. The older child may build castles in the air.....but he is likely to feel restless. Braille reading is combersome and tiring, and therefore, a difficult habit to cultivate; no hard and fast rule can be followed as each child differs from the other. Some may enjoy crafts, others may like collecting things, or constructing things. Still others may enjoy letter-writing and pen-pals. Some children excel in indoor games. However, invariably, if a blind child is left, leisure-time becomes a major burden to him. He will not know what to do and may even use the time to brood.

What of our rural blind? They need to have some education, at least......i.e. academics. But how much? Where? and How?

If rural blind children have to follow a 'normal' school syllabus....there is no harm....except that the wastage of time is very important. Time which can be

utilised learning something practical and useful is used in finding out the sum of a + b. Of what use is it if he knows only the circumference of the earth, but not about his family acres? Does it help to learn the names of fertilisers if he does not learn which fertilisers are useful to him? Is a mere biological description of the eye useful to him? Would it not be more useful, if, coupled with his learning about the eyes, he learnt the causes of blindness and what can prevent it? Surely there is no better prophet to the villagers than their own blind persons, no more accepted person who can tell them about blindness, about health, about adult education.

The rural blind can surely be trained for half their day or half the week, in crafts, farming skills, associated dealings in as practical a manner as is possible. Self-employment and family-involvement should be stressed and their value enumerated and proved.

Do 'teachers' prove a problem? I have below a slightly exaggerated, but inherently sound idea from another teenager: 'Only headmasters would receive specialised training at full-time colleges. Other teaching would be a version of conscription, each member of society would be asked to contribute a certain proportion of his time to take a course and teach and educate others in his particular skill. In this way, those at places of education would receive fresh information from a variety of people, learning at the same time to accept people with their own enthusiasms and shortcomings. This system would also help ease the shortage of teachers and the constant bickering about wages and hours.'

Domestic Science and House Crafts which should be taught generally, to all blind students, should more especially be taught to the blind women in villages. Many of them may become emancipated enough to work besides their men in the family, but others should at least know how to care for house and home. There is certainly no harm in the boys learning either.....so that they can help to free their women in the villages by showing that the job of 'house' is not necessarily the exclusive priviledge of women. Such classes should be conducted in a natural, relaxed atmosphere....in an actual home where possible. The key to the entire situation seems to be that we must realise 'It is part of everyday life, and an enjoyable and very interesting part.' When learning ceases to be looked upon by blind children as a chore, but instead as a sequence of processes just as enjoyable, and more fulfilling, then the educational system will have justified itself.

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2.6.0 TEACHING THE VISUALLY DISADVANTAGED FOR CREATIVE AND CRITICAL THINKING IN SECONDARY SCHOOLS

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ABSTRACT

Education of the visually disabled is a very complex and delicate activity often burdened with a load of charitable obligation and cynicism in the name of rehabilitation. Apart from the fact that teaching the visually handucapped pre-supposes a teacher's attainment of very delicate and difficult teaching efficiencies, the critical and creative power of thinking of the visually handicapped at the secondary schools should be more delicately and minutely nurtured in an ideal atmosphere of freedom and spontaneity. The present study aims at a few identifications of teaching activities for the visually disadvantaged and guidelines for teachers such as activities with specific teaching plans considering maintenance of the different stages of preparation, incubation, illumination and verification, and elimination of excessive use of gadgets and appliances for proper manifastation of creative and critical thinking.

The present researcher has a poignant experience of having an encounter with one of his blind students who has a very colourful academic career from Presidency College and the University College of Arts and Commerce, Calcutta, and who identified his teacher after a lapse of eleven years simply by his sensory experiences and prodigious power of memory. In fact, from a very close association with

his blind students for a pretty long time, the present researcher is of the opinion that blind pupils normally have the exceptional power of recalling incidents or any other subject-matter whatsoever not merely because a certain sense of rigorous concentration prevails in all their activities or thought-processes as an under-current but primarily because the creative and critical faculties within themselves remain very alert and eager by virtue of being continually exercised. Added to these are the spontaneous manifestations of finer sensibilities and softer emotions of life that always seek the prize for self-expression specially in case of those who are visually handicapped. While a specific sense of general awareness to the alarming truth of blindness is hopelessly ignored; an India, having the largest blind population in the world, after Egypt (blindness accounting for 50 per cent of all cases of physical disability) 30 per cent of India's blind people losing vision before 21 and 12,000 children below 12 becoming victims to blindness every year for lack of vitamin A - teaching the visually handicapped for creative and critical thinking has not yet been given proper emphasis in the curricular or co-curricular activities in secondary education. Unfortunately, teacher education in the specific sphere of orientation for meeting the challenge of fostering creative and critical approach to learning by blind pupils has not yet made significant advancements. Consequently, the bewailing lot of a blind student and his mute cry are lost in the aggravating either of indifference and oblivion like Milton's Samson : 'O dark, dark, dark,/ Amidst the blaze of noon/ Irrecoverably dark, total eclipse / Without all hope of day' Should we accept this tragic state of life by remaining cruelly silent and passive ?

Identification

What is of utmost importance in teaching the blind at the secondary schools is to identify the skills and sub-skills and respective components to open out new vistas of creative imagination and critical awareness. And, prior to this identification of teaching skills for better teaching efficiencies for teaching the blind students, the following may be considered :

(a) to be thoroughly and sufficiently acquinted with the causes of blindness;

(b) to be familiar with the family background from all possible points of view;

(c) to be well aware of the social atmospheres and environmental attitudes towards blind pupils;

(d) to be identified with the blind pupils' sense of fears and vicissitudes to accommodate himself with the sighted ones;

(e) to locate the reasons for unusual passivities and utter sense of loneliness and frustrations as a consequence of blindeness.

Having considered the above points of view a teacher, in order to enkindle the unique creative and critical spirit of a blind pupil, might identify the following areas of teaching activities :

Stage A : The Preparation Stage

This stage may, again be analysed into the following sub-stages :

Sub-stage 1 : The Initial stage

Sub-stage 2 : The Intermediate stage

Sub-stage 3 : The Final stage

Sub-Stage 1 : The Initial Stage

This is a very significant stage because at this stage a blind pupil is for the first time alienated from his family background to a totally new and queer world - a school. Here the agonies of a saddened heart are abruptly choaked as it might be felt by a blind student at the outset, and the greatest care and caution to be taken in this connection is to create such an atmosphere in the school as to wipe out the major points of differences between a school and a society. As a matter of fact, the seeds of frustration in case of a blind student can hardly thrive if the school becomes his very own home, his sweet second home.

At the initial stage the following areas of activities for the development of a blind pupil's creative and critical potentialities may be considered :

(i) to identify the blind pupil's trends and tendencies of behavioural changes from time to time and to define, explain and translate into reality the pioneering avenues of creativity and critical awareness manifested in thoughts and expressions;

(ii) to foster the spirit of oneness and an intimate sense of relationship between the sighted and the blind through a harmonious mode of living in the same campus under the same residential accommodation ;

(iii) to fillip the increasing spirit of creativity through introduction of performing arts like music, dance, drama, recitation, eloquence compeition and so on, and to help the spirit of co-operation thrive in a joyous and thrilling atmosphere of learning;

(iv) to introduce games and sports suited to the abilities of visually disadvantaged children and to maintain a cumulative record of progress achieved from time to time;

(v) to inculcate the spirit of greatness and generosity and an over-all genuine love for the motherland by inviting outstanding personalities from every walk of life so that the spirit of creative and critical consciousness might, at the very cocoon stage, be nurtured with appropriate and sufficient exercise of emotion and numerous other expressions of mental behaviour explicit or implicit;

(vi) to arrest the significant variations of adjust-abilities, acceptances and rejections of different curricular and co-curricular activities for the visually handicapped and to suggest appropriate measures for elimination of undesirable consequences leading to stagnation, misuse and/or indifference to a blind pupil's creative and critical power of imagination;

(vii) to rejuvinate the spirit of creative genius through association of the teacher's own creativity and critical consciousness by means of appreciations, critical analyses, comments and so on.

From a study of the above areas of activities for the development of a visually disadvantaged student's creative and critical endeavours, it might apparently be

felt that there is practically no major point of departure from teaching the sighted students but the point is that while in case of the former the teacher, being in most cases blessed with normal vision, find a more or less common platform of creative and critical thinking, in the case of the latter, training of expression and specialisation of understanding the blockades in the mainfestation of creative and critical thinking of a visually disabled student remain a far cry in the arena of teaching. Obviously, what is essential to the understanding of a blind student's creative and critical thinking - to feel his very pulse for self-expression and self-criticism with a view to establishing his originality of approach, and to enkindle him accordingly - remains far away from the slovenly and slipshod method of traditional form of teaching. The following table (Table 'A') shows a monthly programme of the different areas of activities for the visually handicapped at the initial stage for a better exposition of their respective creative and critical faculties :

TABLE-'A'

Sub-Stage 1 : Initial Stage

Period	Name of activities	Specification of activities
1st week	Orientation	Introducing the visually handicapped pupils with the new atmosphere of the school through a synoptic presentation of its various programmes of activities throughout the session.

Period	Name of activities	Specification of activities
2nd-4th weeks	Group formation Indidivual and Group work.	Defining the role of teachers and pupils and distribution of programme of activities after a through and explicit explanation. Individual interviews by teachers a) with sighted pupils and recording reactions b) with blind pupils and recording reactions Group interviews by teachers a) with sighted pupils and recording reactions b) with blind class-mates and recording reactions Familiarisation with gadgets and other educational equipments specially meant for teaching the blind viz. Braille books, maps, charts, writing appliances and so on.

Sub-Stage : 2 : Intermediate Stage

Notwithstanding the fact that this stage is a mere compartmentalisation only in fact and not in spirit, it is a step forward from the initial one in which further understanding of the problems relating to creative and critical afflorescence of the visually disabled are very properly and scientifically diagnonsed, and appropriate and timely remedial measures thereto are taken up. Naturally, this stage equips the teacher of the visually handicapped pupils with added informations and pin-pointed suggestions to discover the mystery of creativeness and critical exuberance available or likely to be available through

careful interactions from time to time.

As regards the areas of activities at this stage, the following may be considered for dealing with the creative and critical thinking of the visually disabled:

(i) to identify the fountain of each individual creative mind with the help of sufficient allowance for the freedom of exercising the activities already chalked out and implemented at the initial stage;

(iii) to arrest and analyse the peculiar trends of mental behaviour of a blind pupil - his joy, his sorrow, his manifold emotional expressions and outbursts along with other socio-psychological currents of mental development;

(iii) to identify physiological changes of the blind along with creative and critical assessments whatsoever for a balanced understanding of his insight and awareness which are productive and fertilising, spontaneous and diverse;

(iv) to be acquainted with the diverse channels of undesirable and dubious expressions of the visually dis-advantaged emerging or likely to be emerging out of creativeness and critical spontaneity, and to create and establish avenues for ereadicating these sources through adequate and timely intervention with humour and with love and affection that the teacher thinks appropriate;

(v) to create a healthy atmosphere for each blind student to proud himself into creative activities and to stimulate his power of critical thinking ;

(vi) to liberate the visually disabled children from unusual and overzealous authorities by teachers, class-mates,,

parents or guardians so that the nagging and devastating sense of fear that eats up all blooming vitalities of creative and critical spirit might not, under any circumstances, get the upper hand;

(vii) to eliminate the constant diet of printed matter normally prescribed in the traditional approach to teaching that paves the path to dangerous habits of intellectual and creative torpidity particularly in case of the visually disadvantaged.

For a proper synchronization of the above areas of activities at the Intermediate stage in teaching the visually disadvantaged for their creative and critical thinking, the following table (Table B) may be considered. It might be noted in this connection that Table on 'B' maintains an almost uniform continuity with the programme of activities already referred to in Table 'A'.

TABLE : B

Sub-Stage - 2 : Intermediate Stage

A Monthly Programme of Activities for Teaching the Blind at the Secondary School for Creative and Critical Thinking.

Period	Name of activities	Specification of activities
1st week	Orientation	A brush-up of activities already planned and executed at the initial stage through a reorganisation of short-time courses by teachers.

Period	Name of activities	Specification of activities
2nd- 4th weeks	Group formation Individual work Group work	Formation of groups according to creative and critical variabilitics Psychological preparation for individual potentialities : (i) sensing the attitudes (ii) understanding the interests (iii) evaluating the aptitudes (iv) diagonosing the skills (v) launching remedial measures leading to the liberation of creative and critical potentialities. Group and individual interviews by teachers. Selection of essential teaching aids and apoliances. Identification and selection of co-curricular and extra-curricular activities.

<u>Sub-Stage - 3</u> : <u>The Final Stage</u>

At this stage of preparation for creative and critical thinking, in the case of blind students the two other sub-stages already referred to are synthesised and a wider avenue is created for opening out individual brilliance in creativity and critical awareness. Whereas in the former two sub-stages acquaintance with normal and specified in-roads to creativity is generally foreshadowed, here, in case of pupils at this final stage, absolute liberty is allowed to form images and voice forth expressions leading to originality of approach with a harmonious blending of change in innovation. Here the learner reigns almost supreme in his exposition and expression oral and/or written, and the teacher is there to identify the specific intentions and obstacles of the visually disadvantaged learner.

The areas of activities at this final stage for preparing a visually handicapped learner to cultivate his power of creative and critical thinking may be stated as follows :

(i) to identify the exact uniformity of thought-processes required for the visually disadvantaged learner to launch upon a subject of creative and critical thinking and to stimulate the required procedures already being directed at by the teacher at sub-stages 1 and 2 ;

(ii) to encourage the visually disabled to stick to a particular point of interest or concept allied to his creativity and attend to his sense of awareness for critical assessment ;

(iii) to consider the dynamic urge of a visually disabled for self-expression through a systematic analysis of his real state of mental, physical and emotional maturity and the nature of the educational equipments supplied to or handled by him;

(iv) to allow an appropriate atmosphere for the visually disadvantaged learner to understand the result of his own activities as quickly and spontaneously as possible and to establish thought-processes as his very own, that is, originating from himself and from nowhere else;

(v) to enable the visually handicapped student to be well-adjusted with the inherent capacity to systematize the process of creative endeavour and critical thinking, the objective being to be prepared for a deeper and more worth-while landmark of creative spirit and critical approach.

The above-mentioned areas of activities for the preparation of visually disadvantaged pupils in achieving

creative and critical heights may be tabulated as follows :

TABLE : C

Sub-Stage - 3 : The Final Stage

A monthly programme of activities for teaching the visually disadvantaged pupils at the secondary school for creative and critical thinking .

Period	Name of activities	Specification of activities
1st week	Orientation	A brush-up of activities already planned and executed at the initial and the intermediate stages of preparation and a summing-up for synthesis of creative and critical thinking.
2nd-4th weeks	Individual work Group work	Individual work : i) Identification of individual potentialities of a visually disabled learner through intimate association inside and outside the class-room by the teacher. ii) Appreciation of a visually disadvantaged pupil's creative and critical thinking however insignificant and trivial it might appear, and creation of a joyous atmosphere through the teacher's own contribution to creativity and critical approach to thinking. iii) Maintenance of dramatic suggestibilities to heighten the visually disabled pupil's spirit of creative adventure, and pointing out the possible

avenues of worthwhile novelities that will ultimately glorify his approach to creative and critical thinking.

Group Work :

i) to understand and appreciate the different creative and critical approaches to thoughts and imaginations, and the innovative styles of creative and critical brilliance of other pupils .

ii) to share the common evaluating principles of creativity and critical standards, howsoever reflected.

iii) for comparative study of creative and critical thinking of the sighted and that of the visually handicapped.

Stage B : The Incubation Stage

At this stage the visually disabled pupil requires ample protection from an unduly narrow and short-sighted view of intellectual and imaginative discipline from which his teachers occasionally fall back on as a line of self-defence in the name of pupil-discipline. In fact, loss of imaginative and intellectual freedom in case of a visually disadvantaged student automatically hampers the incubation stage of his creative and critical thinking. What is very essential at this stage is to protect him from all discouragements in the form of analyses and data-collections, guessings and undue hypotheses showered upon him torrentially by teachers in excitements, that ultimately kill the imaginative

and intuitive potentialities of the creative and critical mind. An eye to mere academic success for attainment of stereotyped proficiency has hardly any worthwhile contribution to the teaching of the visually disadvantaged who, alas, are even now considered more pitiable than exceptionally powerful at the incubation stage of creative and critical thinking.

Stage C : The Illumination Stage

This stage is one of suddenness, of elation when, after a prolonged thought-process, a visually disadvantaged pupil finds the crystals of creative and critical thinking. The teacher makes a quick and thorough enquiry of all pre-suppositions leading to the appex of illumination, since they might fade away in the march of time, and allows his pupil to share the joy of creativity and critical awareness through criticism and evaluation.

Stage D : The Verification Stage

At this stage the teacher places before his visually disadvantaged pupils his own contribution to critical and creative thinking for verification and comparison and for numerous other points of qualitative analyses.

Guidelines

From a study of teaching the visually handicapped for creative and critical thinking in secondary schools, the present researcher considers the following points very essential to the promotion and successful contribution of creative and critical thinking :

(i) to allow the visually disadvantaged pupils to have a free and easy encounter with his teacher under any circumstances;

(ii) to allow a free interplay of ideas between the sighted and the visually handicapped pupils to become disciplined thinkers;

(iii) to allow the visually disadvantaged pupils to foster and intensify their inner creativity and critical consciousness through consistent and well-directed exercise of freedom;

(iv) to eliminate an excessive use of scientific and technological gadgets that more or less destroy creativity through repetitive, fractured and unusually simplified operations often devoid of meaning and context. External interruptions and consistent stop-gaps often blur the aesthetic and delicate membranes of critical and creative thinking of the visually disadvantaged;

(v) to launch curricular and co-curricular activities like giving dictation, reading out books, newspapers, journals, arrangements for performing arts - sports and games, dance, drama, mime and so on, for the visually dsabled pupils with an eye to creative and critical endeavour ;

(vi) to re-orient classes like geography, geometry, weaving, woodwork etc. with a greater amount of superior scientific tools and appliances, and to allow the visually handicapped students to have every opportunity to identify, test and modify them and suggest improvements;

(vii) to eliminate every possibility of conditioning a visually handicapped pupil to any other apparently superior concept other than his own, which frustrates his own critical awareness and creative ambition and debars him from understanding the fact that we are as we are creative and critical in thinking.

Synthesis

The present study is expected to have some impact on teaching the visually disadvantaged for creative and critical thinking in secondary schools in spite of the fact that a comparative approach to creativity and critical awareness in case of the visually disadvantaged and that of the sighted might reveal newer and more comprehensive avenues of educational process; but, then, the reality of the utter indifference to education of the visually handicapped in general and educationfor bringing out their creative and critical potentialities in secondary schools in particular can hardly be ignored. Besides creativity and critical brilliance that should normally ensure rehabilitation especially in case of visually disabled persons but painfully denied in India, what is a sordid fact is that only a few voluntary organisations really feel for them and provide opportunities for livelihood.*

Since teaching is a very compelx procedure, and teaching the visually disadvantaged children in particular is a more complex and delicate one, what is primarily required is a sharing of views and opinions among researchers and outstanding personalities devoted to the teaching of the visually handicapped for critical and creative thinking. Moreover, the administrative procedures to cover this particular area of education have not yet undergone sufficient scientific and objective co-ordination. What however, is of immediate necessity is a co-operative endeavour to identify and evaluate the creative and critical thought-processess of the visually disadvantaged pupils by means of necessary

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*The Oxfam provided services for 72 blind persons in West Bengal, (All India Radio, Calcutta: Local News on August 18, 1980).

identification, implementation, specification, gradation and integration. Unfortunately, teaching the visually disadvantaged in secondary schools in India has not yet been geared to that height of excellence. Let light be no longer denied to those who might take up the challenge of 'total eclipse' . Let us, as teachers, show a greater amount of love and affection for them. Let them be allowed to march forward as glorious citizens of a better India by dint of their creative and critical excellence.

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3.1.0 - EDUCATION OF THE DEAF

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The paper approaches social, economic and psychological rehabilitation of the deaf as equivalent to education of the deaf. The utility of sense training includes auditory training, procedures of voice culture, speech breathing exercises, method of speech teaching and auricular method of teaching with certain modifications have been included in the paper. From the data from our Audiological Clinic of the Calcutta Deaf and Dumb School, the author has found that 5% of the deaf have a hearing loss of less than 60 dB, 31% have that between 60 dB to 80 dB and 69% have losses of 80 dB or above. The paper also includes a system of classification of the deaf population. A comparative study of group hearing aids and individual hearing aids are significant in the early years preferably between 9 to 24 months. Reasons for an integrated system of education have been given. Some investigations made in the Research Departments of the Clarks School for the Deaf, U.S.A. by the author on the basis of Kymogram have been cited. The investigation utilises types of speech, error of the deaf by Hudgins and Numbers. It has been suggested that economic rehabilitation of the deaf must be supported with craft education according to aptitude, interest etc. and psychological rehabilitation depends on their success at social and economic level.

Education of the Deaf chiefly means their rehabilitation at Social, Economic and Psychological level.

SOCIAL REHABILITATION:

In the formative period children learn speech and language both for reception and expression through hearing. The hearing handicapped children cannot hear and are not able to receive impression of spoken language and consequently they cannot acquire speech as their normal hearing brothers. The deaf children can see, they can feel, they can also possess residual hearing of different quantities. We have therefore, to resort to multisensory approach for the education of the deaf. The senses of touch, sight and hearing are to be trained for teaching speech and speech reading.

SENSE TRAINING:

The ability to perceive similarities and differences is the first step afforded to a deaf child using sense training material. Formerly sense training works were confined to the training of the senses of touch, kinesthetic and sight. Now auditory training has been included in the sense training work as the sense of hearing is now being utilised along with sight, touch and kinesthetic sense for the development of speech and speech reading.

This feature of sense training work is likely to render easy the acquisition of the following habits

which in their turn may be helpful in speech teaching and lip-reading or speech reading:-

1. Attention
2. Concentration.
3. Observation.
4. Imitation.

VOICE CULTURE:

Formerly to secure voice the child was asked to compare and contrast the chest vibrations set up in chest of his teacher with his own and learnt by imitation to set up similar chest vibration in his own chest. Voice culture was performed through isolated vowels.

Speech sounds were not presented till good voice was obtained. Consequently teaching of speech sounds was delayed. The writer worked with the deaf for a long time and also on his experience from the U.S.A. felt the necessity of modification of procedure of voice culture as stated below:

1. Voice should be obtained by Babbling or other informal methods.
2. Mono-syllabic words or syllables instead of isolated vowels should be presented for voice culture.
3. Balloon may be used for cultivating good voice. When a teacher babbles near the balloon, vibration is produced on the balloon and the children feel the vibration through their fingers and then they try to imitate voice.

We consider happy, relaxed and playful mood condusive to the production of good and natural voice. Early admission and early use of hearing aid have simplified the procedure of obtaining good voice.

BREATHING EXERCISES:

Formerly the teachers of the deaf had the impression

that breathing exercises are condusive for acquiring good speech. It has been proved by Dr. Hudgins that speech breathing exercises instead of mere breathing exercises are considered helpful as they induce proper breathing co-ordination and are helpful in developing continuity and natural speech.

Formerly the teachers of the deaf had the impression that the lower chest type of breathing is the best type of breathing for producing good speech. Sibley Haycock of England is in favour of lower chest type of breathing for good speech. The writer investigated this aspect in the U.S.A. and had a Kymogram in the Laboratory of Clarke School for the deaf in the U.S.A., and in the speech of the writer it was found that clavicular breathing took a prominent part although it was a mixed type of breathing. It is found that a normal person can speak well with any type of breathing. There is no sensible reason why the deaf will prove an [illegible] useless to draw the attention of the pupil and to make an effort, for that end. Hence such attempt was stopped and the deaf children are now benefited with this finding.

SPEECH TEACHING:

The analytic or element method of teaching speech was followed in the past. The same method was applied to the deaf children without consideration of differences existing in individuals. Now it has been realised through our experience that many individual differences are present in deaf children such as degree of hearing loss, type of hearing loss, intelligence, age at onset, presence or absence of other handicaps etc. which should be taken into account in planning a developmental speech programme for them. The writer on his return from the U.S.A., introduced the syllable method of speech teaching in as much as this is in conformity with

the process of acquisition of speech by normal hearing children. We present syllable or words synthetically for imitation. We accept if a child can successfully imitate them. If any one fails to utter any word or syllables synthetically, we then try analytically.

THE USE OF HEARING AIDS IN THE EDUCATION OF THE DEAF CHILDREN:

Formerly the methods of education were based on the superficial assumption that the hearing impaired children had no useful residual hearing. This theory was exploded in Great Bretain in 1899 as a result of the researches in the education of the deaf made by Dr. James Kerr Love.

The writer was a student of Dr. C.V. Hudgins, Director of the Research Department of the Clarke School for the Deaf, U.S.A. in 1954-55 when he had the opportunity of closely studying his research works and his findings which have conclusively proved the benifits ever derived by the profoundly deaf (i.e. 80 dB above in the speech range) as regards speech intelligibility, speech perception and acceleration of educational programme from an acoustic training procedure. Dr. Hudgine opines that speech perception is improved when auditory and visual perceptions are combined and the ear supplements the eye. Dr. O'Conner, Superintendent, Lexington School for the Deaf, U.S.A. is of the opinion that children with hearing lossess upto 90 dB can benefit from hearing aids. The writer on his return from the U.S.A. in 1955 suggested the extensive use of hearing in the cases of children upto 90 dB hearing level with the help of hearing aids and also for introduction of systematic auditory training.

In India unfortunately we have no reliable data regarding the size of the deaf population and their classification. The deaf were last enumerated in 1931 censes when

the number of the deaf was 2,30,000. Recently we came to know from the statement of the Government of India that their number is 2 to 3 million.

The Calcutta Deaf & Dumb School has an Audiological Clinic equipped with a pure tone Audiometre for measuring hearing level. We conducted Audiometric testings with the students of the Calcutta Deaf & Dumb School. We observed the following classifications:-

(I) Hard of Hearing Group.

Hearing loss less than 60 dB in the speech range, i.e. 500, 1000, 2000 C/S.

(II) Partially Deaf Groups.

(Hearing loss in speech range - 60 dB - less than 80 dB.)

(III) Profoundly Deaf Groups.

80 dB and upwards in speech range.

From the data that we have collected we find that about 31% of the students have average hearing loss less than 80 dB in the speech range and about 69% have losses of 80 dB or more. Out of the 31% mentioned above 5% have average hearing loss less than 60 dB in the speech range.

According to the data now available, it may be inferred that out of 4 lakhs of impaired hearing children we may have 20,000 hard of hearing children (5% of 4 lakhs less than 60 dB hearing loss), 104,000 partially deaf children (26% of 4 lakhs -60 dB-less than 80 dB hearing loss) and 276,000 profoundly deaf children (69% of 4 lakhs -80 dB and upward hearing loss).

The electrical hearing aids are mainly of two types:

1. Individual hearing aids and
2. Group hearing aids.

We have been using both the types in the Calcutta Deaf & Dumb School.

A comparative study of Group Hearing aid and individual hearing aid reveals the following:-

1) Group Aids are more powerful than the Individual aids.

2) Group aids are generally mains operated and individual aids are battery operated.

3) Individual aids are more delicate than the Group aids.

4) A wider frequency response in Group hearing aids than that for individual hearing aids.

5) Group hearing aids are more suitable for class work than the individual hearing aids.

6) Less distortion and less room interference for Group hearing aids if spoken directly to the mike even in a room not accoustically treated.

7) The users of individual aids have the advantage of free movement and out door use. The improvements of individual hearing aids are increasingly reducing the areas of difference.

The Calcutta Deaf and Dumb School has all the twenty-three classes equipped with group hearing aids. It has also 77 individual hearing aids.

Hearing aid receivers may be of two kinds:-

1) Air conduction receivers.

2) Bone conduction receivers.

Deafness may be Conductive or Sensory neural or mixed. When the defect is with the middle ear i.e. conductive type/ and the internal ear is intact, bone conduction type receiver was preferred in this case. Air conduction receiver is indicated in the case of the Sensory neural type of deafness. It is now the consensus of opinion of the authority that the air conduction receivers work more effectively in majority cases of both the types. The

conduction receiver is less efficient than the air conduction rec   for high freq   ncies (2) Due   the impedance of bone and skin, a considerable amount of power is required at the receiver to produce an audiable signal.

AUDITORY TRAINING:

The importance of systematic auditory training can not be over emphasised. It is a procedure through which a deaf child acquires the ability to use his residual hearing to the maximum extent for production and perception of speech. Its aim is mainly to develop skill listening in comprehending speech that is imperfectly heard. Ewing stated "the acquisition of speech readiness is always quickened by auditory training that leads a child to use his capacity to hear especially in relation to speech. Spontaneous speech is the direct result of speech readiness". In this connection we   ould understa   how the capac ty to distinguish different sounds is developed in the case of normal hearing children. At first the baby does not recognise the differences between different sounds. He learns to recognise them by stages. Likewise the auditory training is administered to the children with impaired hearing by stages. The rational process is   easy to difficult. That is the distinction of dissimilar sounds that are easy to make are presented first for discrimination. The four main stages of auditory training are:-

1) Awareness of the presence of sound.
2) Discrimination of gross sounds.
3) Discrimination of vowel sounds.
4) Discrimination of speech sounds.

Auditory trainin is imparted to the students of the Calcutta Deaf and Dumb School from the age of 4½ years.

The classes are equipped with numerous auditory training materials interesting to the children. Record players are also used. The programme of the school includes the following:-

a) Recognition and discrimination of gross sounds.

Various musical instruments viz. drum, bell, whistle, flute, horn, pitch pipes, piano, cymbal, banjo etc. and many other noise producing toys covering a wide range of frequency are presented to young students for consciousness of sound and also for building up their ability to recognise their differences. We have been using H.M.V. sherpa Record Player battery operated and Gerrad Record Player, mains operated, for auditory training. Recorded music mainly rhythemic, sounds of different animals and birds and different sound effects viz. telephone bell, ocean waves, flowing river, thunderstorm, rain etc. are played back and fed to the students through their earphones. The students discriminate and associate those sounds with their sources.

Then vowel sounds are presented for discrimination through listening. Thereafter speech sounds are given for discrimination - first two words selected for auditory training are those which differ as to number of syllables.

Simple sentences which differ as to length and number of syllables are then presented for discrimination.

Type and degree of hearing loss ascertained by Audiometer may indicate the following:-

1) Cues are available to the listener.
2) Cues can be made available to the listener through training.
3) Cues are not likely to be available to the listener at all.

The qualitative improvement of education of the hearing impaired child is dependent on effective utilisation of hearing through hearing aids in the early years. First

three years of child's life preferably 9 to 24 months span is highly important and indeed the formative period and can also be attributed as a period of "speech readiness" when his organism is most open to speech and language stimulation. Edith Whethnall and Fry called the first year as period of "readiness to listen". During this period the faculty to learn discrimination is so great that the hearing impaired child can learn to use cues in learning to speak which are no longer available for the older child. Edith Whetnall is of opinion that no deaf infant is too young to wear a hearing [illegible] to crawl i.e. at the age of 8 or 9 months. S. Richard Silverman of U.S.A. stated "the early years are optional for establishing the foundation for the child's acquisition of communication and his emotional muturation". During early years environment plays an effective part in creating moulding and shaping the personality. Impression received during this period inhere in the child and produce prevading and lasting results. The organs of speech including voice remain facile and soft and are essentially receptive. The mind and muscular skills involved in acquiring speech and language fabourably react and are condusive and congenial. During this period there is a natural urge and stir to acquire speech and language. If we do not teach him to use his hearing from the early years, he gets in the habit of paying no attention to it. But we are to develop his interest in hearing. It should be noted that all the hearing present at birth is a reflex and hearing is also acquired by learning. All sounds are at first noises without meaning and are learnt from reflex hearing to comprehension hearing. Early detection and diagnosis is therefore very important. The parents must be taught to play their part - they must understand/the need to learn to hear

during his very early years. An useful utilisation of his early years will reduce the difference that exist as between a normal child and an impaired hearing child. The differences that do exist may to a large extent be ascribed, to the neglectful use of pre-school childhood. Nevertheless, unfortunately, in our parts of the country, this period has not been profitably utilised as yet. The programme for effective utilisation of this period would be coupled with the necessity of establishing clinics with a programme for parent guidance to successfully and effectively ensure early training.

Expert guidance for parents of impaired hearing children is now available in the west from a number of institutions and organisations. In the U.S.A. correspondence course of John Trady Clinic for helping the parents may be mentioned.

I had the fortune of visiting Russia and Japan recently. I was very much impressed with their pre-school programme. In Russia about 14 years ago parents as a rule placed their impaired hearing children at special Kinder garten of special pre-school homes. But in the last few years research has shown that to bring up a impaired hearing child in the family has its advantages over even the best equipped specialised educational institutions. Today many parents take advice from the Surdopedic Centres and the University for parents for training in the early years of their impaired hearing children. A council has been set up for helping the parents of the handicapped.

Japanese mothers have been encouraged to train their deaf children even from their tenth month with the help of hearing aids.

The writer on his return from the U.S.A. introduced Silent Reading in the Calcutta Deaf & Dumb School. It is easy to reach the deaf mind. Recognition of print by

associating printed words, phrases and sentences with pictures is quite lively, easy and interesting.

Formerly printed words, phrases and sentences were not presented unless and until the students could lipread them and speak. The presentation before their ability to speak and lip-read was considered as misapprehension of the fundamental principles of deaf education. The writer could justify the necessity and efficacy of its introduction which resulted in remarkable improvements in lipreading reading and development of language.

INTEGRATED SYSTEM OF EDUCATION:

Recently trend has developed of educating the hearing impaired children in ordinary schools for hearing children.

The hearing impaired children integrated in ordinary schools for normal hearing children will derive social and psychological advantages and it will end the segregation of the hearing impaired children and they will be in normal environment.

There are differences of opinion of the educators of the hearing impaired children as to whom, where and how this system of education can be carried on successfully.

The writer made some experimental works in Hudgins Laboratory in the U.S.A. regarding experimental phonetics through kymograph about effects of consonant closure upon oral pressures and some of the important results are stated below the clear concept of which will be helpful to the teachers for teaching speech to the deaf children:

(1) Air pressure in movements varies generally with the degree of closure of the consonants directly proportional.

(2) Air pressure for arresting consonants have more air pressure than the releasing consonants.

(3) Air pressure for non-vocalised consonants have more air pressure than the vocalised consonants.

(4) Air pressure for the aspirated consonants have more than the non aspirated consonants.

(5) There is little air pressure for the nasal consonants.

REGARDING ADJUSTMENT OF CONSONANTS:

From the point of view motor phonetics the question of adjustment can be dealt with more scientifically. The modifications of the following abutting consonants:-

(1) L is modified by Th as in Altha

(2) L is modified by T as in Ulta

(3) N is modified by T as in Kantak

(4) N is modified by Th as in Anthar

(5) N is modified by Ch as in Tin chatak

(6) Other examples such as Ak Gachha (Aggachha), Chok galo (choggalo) and examples of abutting pairs. In such combinations the surd becomes sonant - voice from the preceding vowel may invade the consonant that follows. Only slow careful speech preserves the prescribed form.

We have five nasal sounds corresponding to five bargas. The rules of combination enjoin that in combination the nasals combine in their own group.

Hudgins and Numbers found two general types of errors of the speech of the deaf (1) Errors of articulation involving consonants and vowels and errors of rhythm.

Consonant errors were confined to the following:-

1. Failure to distinguish between vocalised and non-vocalised consonants.

2. Consonant substitution.

3. Excessive nasality or lack of it.
4. Malarticulation of compound consonants.
5. Malarticulation of abutting consonants.
6. Non function of arresting consonants.
7. Non function of releasing consonants.

Vowel errors were:-

1. Vowel substitution.
2. Malarticulation of dipthongs.
3. Dipthongisation of vowels.
4. Neutralisation of vowels.
5. Nasalisation of vowels.

The rhythm of speech samples were of three kinds:-

1. Correct rhythm.
2. Abnormal rhythm.
3. Non-rhythmic

The teachers of the deaf are to note carefully the types of general errors and to correct them when occur after their acquisition of speech in a special way. If this can be done effectively the deaf will be able to maintain intelligible speech.

ECONOMIC REHABILITATION:

For economic rehabilitation the deaf must be equipped with Craft education according to their aptitude, interest and family background utilising their unimpaired capabilities.

PSYCHOLOGICAL REHABILITATION:-

Of all the problems the psychological rehabilitation of the deaf is the most difficult one and requires a very delecate treatment and depends to a large measure on the success of the deaf at other two levels viz social and economic level and their understanding at home, school

and environment. People in general should also be alert as to their duties towards the deaf. A conscious feeling of sympathy for the deaf in the minds of the people may go in great way to secure their psychological security.

The severely/profoundly deaf children were diagnosed as suffering from sensori-neural deafness, which is irreversible and incurable. In this paper, they will be referred to as Deaf children.

The histories of 400 children has been recorded with a view to studying the causes of deafness in India. These children had become deaf at birth or before the age of speech development and therefore had no speech at all. They are the children of the country who are labelled as "Deaf and Dumb". There is no medical nor surgical treatment for such cases, and this type of deafness presents a problem, not only to the family, but to the entire country, as world statistics have shown that the incidence is approximately one deaf child per one thousand live births. In a population of 700 million, there will be 700 thousand deaf and dumb children.

The Object of the Research

In view of the said state of affairs, it was decided to carry out Research on the Deaf child's Educational Treatment and Habilitation. The work presented deals with Special Education.

Special education has been defined as "an enriched form of general education aimed at enhancing the quality of the lives of those who labour under a variety of handicapping conditions, enriched in so far as it makes use of specially trained personnel, who are aware of the application of methodological advances in education and of technological equipment to offset certain types of handicap" (Report of an expert meeting on Special Education, held at UNESCO 5th-7th December, 1968).

The Special Educational Aspects.

The Stephen Research school was started with four

deaf children. From their audiograms it was known that these children had some residual of hearing at low frequences, which could be stimulated with powerful hearing-aids, and therefore they were fitted with individual aids with receivers in both ears, and having an output around 130 dB SPL. The Group Hearing-aid that was used for the group of children was imported in 1957. Then arose the problem of which language to teach the children, as their mother tongues differed. The parents decided that since their off-springs had no language at all, it would not matter if I taught them to speak English, as they themselves spoke English.

The single greatest problem the deaf child has to face is a language disability. It has often been said that to teach a deaf child to speak is a minor miracle because the very channel through which a human being learns to converse has been denied to him, that is the sense of hearing. Teaching a deaf child to understand and use language is one of the most challenging areas in Special Education, and the most important as it has a direct influence on all learning and living, man being a social being. At the same time, it is the most difficult, most misunderstood and ardous, excepting of course the education of the multiple handicapped deaf. Lack of language limits academic, social and even vocational achievements, causing the deaf to surmount further handicaps.

A thorough study into the acquisition of the language arts by normally hearing individuals was carried out. A baby hears the language of his environment and at the age of 1 or $1\frac{1}{4}$ years he speaks a few words meaningfully. He soon learns that when words are put together in different arrangements, they carry thoughts, desires and comments. By the time he is 4 years old, he has mastered intelligible and complex

grammatical speech. In this relatively short, but formative period, he has acquired the foundations for the infinitive variations of adult language. B. Tervoort[2] says "These are critical and irreplaceable years". Lenneberg[3] states that children have an innate, maturationally controlled capacity for developing language, provided they are exposed to an adequate sample of the language during the very early years.

The fact that a child is deaf, does not mean that he is not endowed with the same predisposition to learn, as the normally hearing child, but what it does signify is that without early and adequate amplification of speech sounds, he will not receive the adequate sample of language that is necessary for him to utilize this inborn capacity.

Various media were used to make the public and all those closely connected with the work of the deaf, medical and social, acutely aware of this fact. The results were successful and now deafness is assessed and diagnosed in the very young. Home Guidance has become a part of the research programme. Pre-school children attended evening classes with their parents and it was proved that with one year's training, the deaf child benefited greatly in the receptive aspect of language acquisition, before entering school. This project was supported by the Central Government.

The Special Educational Procedures.

The approach that was used was Multi-sensory. The auditory, the visual, the tactile and the kinesthetic senses were significantly trained.

(a) The auditory approach.

Auditory training is to enable the deaf child to make use of whatever residual hearing he has. Electronic aids

used are (i) the individual hearing-aid which is worn on the body, (ii) the individual speech trainer, which is used in class-work for one pupil by the teacher which may be either battery operated or mains operated, (iii) the group hearing-aid, which is non-portable, mains operated and is used for group teaching, (iv) the Loop Induction System which has an amplifier, a teacher's microphone and a wire around the room, which creates a magnetic field and is used in conjunction with the child's individual body-worn aid, with the indicator on 'T' (telephone). This system is used for informal training in the Nursery classes, as the children are free to move around the room, and still hear the voice of the teacher.

The problem of developing auditory language in deaf children is not so simple[4]. The Research School has drawn up a series of Developmental Stages the children have to go through before being exposed to the Sounds of Speech. The general aims are to stimulate every remnant of residual hearing, to develop tolerance for loud sounds, and to enjoy the rhythm of music, and thereby develop a natural, relaxed approach to speech development.[5]

(b) The visual approach

The young deaf child has to use his eyes in learning to understand spoken language. This referred to as lip-reading. This skill must be developed as early in life as possible, before speech teaching, and must preferably start at home. In the initial stages, there are many do's and dont's about lip-reading, which have to be made known to parents, family members and teachers. In school, it may be divided into two categories (i) General lip-reading, which the child encounters in a

natural way all the time, in different situations,
(ii) Specific lip-reading which is geared to the comprehension of specific words in planned situations. Each word should be presented in sentences to establish the understanding of as many language structures as the child needs. Specific lip-reading must be combined with the use of amplified sound.

(c) The tactile or vibratory sense is made use of by teachers in school. If a child is not able to produce certain sounds through the use of the visual and auditory channels, then the child's fingers or hand is brought in contact with the teacher's face or throat with the other hand on his own, while he watches in a mirror the visual pattern he has to match. Amplified sound is combined here also.

(d) The kinesthetic sense is developed by the child himself when he learns to get the feel of certain articulatory movements of the organs of speech.

The whole situation is not as simple as it appears on paper. Thousands of repetitions are needed, as we are using abnormal avenues in attempts to help the child overcome the handicap of the lack of language.

The Research School has developed systematic, progressive approach to train all the five senses, using both custom-made and teacher-made materials. Twenty-two speech charts and 20 language lessons have been prepared for early training in Speech and Language. One new class was added every year, increasing the number of students. Normal school text books were used, as the whole programme of studies and curricula followed closely that of normal schools, with additional lessons in Speech and Language.

In 1964, when the first group of nine deaf pupils had passed the IV std. it was decided to start a Secondary Department. There was and still is a lot of opposition from the Social Welfare Department of the State. The authorities wanted us to start Vocational Training for the deaf, in accordance with the traditional ways of educating the deaf. This matter was given serious thought. Having started the education of these students early, their ages ranged from 11-14. It was felt that they were too young to decide on which vocation to choose and would be forced to accept whatever was available. They were far too immature mentally, educationally, socially, emotionally and even physically. They needed to develop abstract language, which would help them gain the confidence they needed for integration into a world of work.

Education is a comprehensive word. It covers the development of the child's potentialities, not only academically, but also emotionally, socially and of course economically. Education implies much more than just the learning of school subjects, and Special Education has an even deeper and more profound meaning. It must have a stronger impact on those exposed to it and must be of far greater significance for the handicapped individual than ordinary education is for normal people. These bold statements have had the lamp of experience, which has been burning now for 24 years to guide me. Many people and even the parents themselves, felt the children should not be burdened with heavily-loaded high school subjects.

Intelligence tests administered to the students and they were found within normal limits. This convinced me that with hard work we could surmount all difficulties. A secondary education, it was felt, would bridge the way from insecure, unstable adolescence to mature adulthood.

It was up to us to settle the goals, and knowing the children and teachers, so well, I was confident that with God's help our research into higher education for the deaf would be successful.

The broad objectives into higher education for the deaf are generally the same as those in the education of all children. However, the techniques used differ. The fundamental problem was the learning of abstract language by the child. Deaf children understand concrete concepts but experience great difficulty with abstract thoughts, figures of speech and idiomatic expressions. The text books were the same as those for normals, as it was decided to prepare the students for the Secondary Schools Certificate Examination. The children had to learn a Second Language, and Hindi, being the language of the country, was chosen.

Teachers had to be trained and an in-service programme was initiated. The National College of Teachers of the Deaf recognized our need and the papers were sent to the University of Bombay, who acted as Vigilantes.

The Secondary Department was started with the following goals (1) to prove that deaf children are not mentally slow intellectually, but only because of their deafness, hampering their benefiting from the language around them, which in itself is educative, (2) to serve as a laboratory for educational experimentation and change, by developing innovative instructional materials, and using more audio-visual equipment, as the slide and filmstrip projector the overhead projector, whereby the children could lip-read the teacher and at the same time read the projected written word, the movie projector and tape recorders connected with head-phones, (3) to be a stepping stone for integration into normal colleges.

The Advantages of a Secondary Education

1. This planned secondary education gives the students more years for improving their language, which is the root of all their problems. There were many drop-outs after Std. VII, and a study into their adjustment into society revealed that their intellectual malnutrition affected their social life, causing emotional imbalance and frustration, except for those who were rich enough to be self-employed.

2. The curricula is geared to developing not only their powers of reasoning through New Mathematics and Science, but gives the students a wide knowledge of the world around them through social science. It helps develop pre-vocational skills, through Typing, Book-Binding, Needlework and Art. It also helps them to serve others through Scouting and Guiding, and Physical Education betters their health. As High School students they are eligible to compete along-side normals in the High Schools Sports Meet which is held every year.

3. The S.S.C. Certificate is their passport into Colleges.

4. Last, but not the least, it serves as a practice teaching centre for teachers of the Indian Institute for Teachers of the Deaf, which was started in 1974. The institute is affiliated to the Bombay University and the candidates appear for the Dip. Ed. (Deaf) Examination.

Results

Since 1972, 34 students have passed the Secondary Schools Certificate Examination, only 2 have failed;

schools certificate Examination, only 2 have failed; 94% have made the grade of these 34 students, 4 entered Gallaudet College, Washington D.C., one has passed the B.A. and one is attempting the M.A., 2 are still in their third year. 14 students joined Polytechnical, Commerce, Arts and Home Science Colleges. 53% have been giving the opportunity of a College Education, alongside normal students.

These successes prove that Indian Deaf children possess the potentialities for Higher Education, which have to be developed by far-sighted people.

3.2.12

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3.3.0 TEACHING LANGUAGE TO THE DISABLED - A NEGLECTED OPPORTUNITY OF MEDICAL LINGUISTICS.

B Y

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ABSTRACT

Rehabilitating those with language disability is an exacting, essentially explorative and a prolonged task. An ideal programme depends on a thorough knowledge not only of the patient's disabilities but also of his residual abilities. It is in pinpointedly bringing out these sets of informatic for diagnosis as well as planning for therepeutic procedures that the insights and practices of modern linguistics are bound to be of great a source with is as yet untapped. It is unfortunate that in an area like language disfunction we consult a host of specialists like speech therapists, surgeons, clinicians, educationists, psychologists etc. and generally ignore x the linguist whose main business as is now being practiced is quite dynamically to understand language in its development, normalcy as well as dissolution with a physiological bias throughout. A highly sophisticated discipline of structural linguistics exists and quite a number of break-throughs such as cyben-etic modeling of language functions by brain are also coming up. The present clinical and medical personnel are hardly aware of this evolution that is taking place

in an area that is very much pertinent to them. An attempt is made in this paper to bring this point out with an empirical study of cleft palate speech and the relevance of phonetics, the simplest branch of linguistics.

Introduction

The cleft palates, the cerebral palsied, the mentally retarded and the aphasiacs are the four categories of the disabled that demand specialised efforts for teaching language. Of these, rehabilitating the cleft palates is relatively simpler, for their problems are primarily peripheral. Among the others these tend to be neuromotor, neural, cerebral and/or psychological problems. Despite this difference, it is of some advantage to discuss all of them on the common platform of modern linguistics. The paper discusses this larger problem of the relevency of modern insights of linguistics to all these categories with some case-studies of the cleft palates as the starting point.

Despite the existence of many studies 1,8,11,12 on cleft palate speech, at present, an impression does arise that a greater and more consistent consideration of the linguistic aspects of the situation remains not much emphasised and may prove beneficial 2,4,5,7,8,10. In fact some recognition of this lacuna is appearing only in a few recent works. The preeminent and usual communication difficulty of a cleft palate patient is in speech (and not much in language) and that too in its final execution neither much in appreciating the actual acoustic difference per se among his own defects nor,

presumably, in the capacity to send the requisite neural orders to the effector points. It is a 'pure' error in the last step of the executive chain of expressive speech and results in errors in articulation and occurrence of nasal escape on nasality in the speech flow at places where they are not required linguistically. The surgical repair of the defect removes the anatomical hindrance to correct articulation and non nasality but does not restore the defective articulation automatically, specially if the patient is an adult as his defective kinematics is already much habituated. The immediate benefit that may accrue in some cases is that of nasality and that too, of isolatedly utterred vowels see below). Speech theraphy is therefore a necessary corollary to post-operation here.

This therapy is best built on i) accurate appraisal of the cleft palate's actual errors before and after operation with reference to specific phonems phoneme clusters and nasality as they occur in isolation as well as running speech ii) deviding a course of training exercises in the light of this appraisal and iii) administering it over a length of time, keeping track of the progress throughout, till the habilitation is complete. It is held that all these objectives can be served better if we follow a systematic procedure related to the phonetic structure of the language of the patient as developed here.

Material

Thirty nine cases were examined in this line. These are of the following categories; (a) cleft palate and cleft-lip (N=24), (b) cleft lip only (N=3), (c) cleft soft palate only (N=3), (d) Tonguetie (N=5), (e) delayed language (N=1), (f) aphasis (N=2), and (g) psychotic (N=1). All showed errors in uttered speech due to their respective applications and all were subjected to comparable tests for articulatory performance in their own language. Categories (e), (f) and (g) are not reported here. They were examined whereever possibible before as well as after operation. Apart from the psycholinguistic case, the remaining were referred to by the Department of Surgery. Their age group ranged from 3 to 19 years, their languages were Tamil, Telugu, Malayalam, Hindi, Victnamese and English. The routine imformation was throughout recorded in a single proforma that included data on family status, educational qualifications, occupation, pedigree, siblings, dominant handedness and clinical notes. None of them except (e) and (g), were mentally retarded and their language reactions were normal as assessed by general conversational response as well as routine language tests, where needed. In fact, a few cases were exceptionally bright as measured by i) their school reports, ii) general smartness of the response and iii) tests of matching the colour patterns in multicoloured blocks (in the case of young children) as per oral instructions.

The patient population thus represents a 'homogeneous' group of pure kinematic defects of articulation and nasality. The three tongue-tie cases and only one of the cleft palate cases (Case No.8) indicated the possibility of a genetic problem, their siblings or pedigree showed a similar afflic-tion. The rest did not show any such indication.

The details of the cleft varied considerably and ranged from more unilateral cleft lip to complete cleft involving lip, alveolus, hard and soft palate and uvula. The specific pattern of the defect was always given careful consideration on assessing their articulatory performance.

Methodology

a. Empirical

The phonetic performance of the patient was tested in two situations; a) a linguistically artificial situation where he was asked to repeat the examiner's utterance of (i) individual isolated phonemes of his particular language thrice and systematically as per the chart order (Fig.i)[C] at the first sitting and randomly at subsequent sittings and (ii) words containing the defective phonemes in IMF positions and b) a linguistically natural situation, where he is required to (i) name the several pictures or objects shown and (ii) build a connected narration for a story chart. The second gives us a nearer sample of his habitual performance in real life; this reaction is taped, where needed, for a meticulous analysis in speech flow, of the

defects particularly of the nasality. The articulatory performance of each patient is recorded on a separate sheet and also taped, if needed. It was considered desirable to build the full report of each patients performance on a careful analysis of all such data

A general observation is; the patient is usually consistent in his pattern of errors more particularly at the level of repeating of the individual isolated phonemes than in running speech. Relating this pattern to the details of the anatomic defect closely is however not easy because of great variations in the habitual mannerisms as well as the details of the cleft itself, plus compensatory mannerisms specially if the patient is an adult.

b. Theoretical

The theoretical model for our linguistic approach is based on two related propositions; illustrations are mainly with English words and written in ordinary and not IPA spelling, but use Indian languages where needed.

1. To profitably study the phonetic data of any speech output, it is useful to regard it as but a concatenation of several specific phonemes charatteristic of that language so that the kinematics we have to consider would be of just 2 categories; (i) that of the utterance of individual phonemes, isolatedly and (ii) that of the utterance of them in succession or concatenations wherein the connecutive phonemes are likely to undergo blends such as between a consonant (C) and a vowel (V) viz. C.V. for e.g. k.u. -- ku cook) and

a consonant and consonant C.C., which in turn will be of 2 types (i) C = C (Akka, in Tamil-sister), where the 2 consonants are similar, k.k. - kk or (ii) C.C. (acknowledge) where they are dissimilar as in K.A. -- kn. or k.r. -- kr (Crow).

The cleft palate is likely to have greater defect in C=C clusters.

2. To study the phonetic irregularities of a cleft palate advantageously, it is useful to have a complete chart.(Fig.2) of the phonemes of a language in our view picturing them.

i. in all the relevant details of their kinematics such as the crucial place and manner of the movement of the oral structures and

ii. more importantly as representing different sets of kinematic relatedness. The movement of the oral structures involved in the phonemes of a single such set will have a greater similarily as compared with that for the phenemes of a different set. For instance, the kinematics of all the vowels has a greater similarity among themselves than when compared with that of the consonants. The vowels and consonants are 2 different sets. Similarly the kinematics of /a/ has greater similarity with that of /ā/, than with that of /i/. Classifying the phonemes into various categories like this is very much available in the literature but requires greater attention, refinement and constant reference when we keep in view the problem of assessing articulatory defects of the cleft palate.

An empirical justification for the usefulness of this type of modelling may be pointed out; it has been observed in many cases, specially of complete cleft palate, that the patient is very likely to substitute the corresponding nasal phoneme for the basic member of our consonantal kinematic set viz. ng for k, ing for c, n for t, n for t, m for p etc. and not any other way.

Observations

By a close and comparative analysis of the data on the articulatory performance thus collected, many useful deductions can be made. A fuller paper of this nature is being prepared for publication elsewhere, we shall merely present some of our salient obserfations here. The total number of the phonemes to be tested in the Tamil patients compared to other Indian languages is very much less as we may fully exclude the middle 4 sets of the consonants of Fig.i, to test for all of these phonemes that do not exist in their language is not much to the point.

Some of the other interesting observations are; 1) At the level of uttering isolated phonemes, nasality does not occur for the consonants or the semivowels. This is wholly a vowel phenomenon as in also well known and attestable in running speech, when we can easily see that it affects the vowel segments of the words mostly. 2) More importantly, the nasality does not even affect all the vowels, uniformly. The commonest affected is /i/ and/i/ accompanied sometimes but not always by /e/ and /e/ and rarely /ai and /au/, observe the kinematic nearness

of all of these sound (Fig.2) /a/ and /ā/ are rarely affected. It is very rare to find all the vowels nasalised. Infact, the picture of the preopparative vowel performance is so consistent and individualised for each patient that one can grade his prognosis of recovering absence of nasality after operation, depending on this picture itself. If only /i/ and /i/ are affected, nasality for them - at the level of individual phonemes, though not necessarily for running speech - is likely to disappear totally immediately after surgical repair. This will not be so, if /a/ and /a/ and more so, if all the other vowels are also affected. 3) Quite often, even though we may not find outright nasality for individual vowels, the visible defect in their utterance specially for /i/ and /i/ can be easily rated by such terms as not so good in performance, anormal in quality, or difficulty in starting. In general, the errors of the vowel performance are; misarticulation or commission but never a substitution viz. an /a/ is never replaced by /ai/ etc.

Among the consonants, the nasals are mostly utterred without any difficulty, sometimes they are outright omitted specially /ing/and /m/, the latter, particularly in a cleft lip patient. Just like the vowels they are also never substituted by any other sound. /ing/ and /n/ is never substituted by /ṇ/, /m/ etc. It is thus the first of the consonant set of Fig.1 only(viz. k, c, t, t, p) that suffer from all the four possible errors; omission, substitution, misarticulation and approximation (e.g./k/ by a glotta stop). Quite often

as stated above, the first consonant of the set is substituted by its corresponding nasal as k – ng, c – ñ, t – n, t – n, p – m. However, a more common substitution is by a simple vowel /a/ or an aspirate /ha/. Among the semivowels /y/ and /v/ are the least affected /r/ being the most affected.

The advantage that accrues from our linguistic approach concerns both diagnosis as well as theraphy

For diagnosis, this helps (i) to appraise the phonetic errors as specially related to the structure of the language of the patient concerned and (ii) to bring out the full pattern of the speech disturbance of each patient, carefully and systematically. These two measures will help not only in exhausting the available data properly but also in enabling us to compare the performance of different patients on a common framework. An interesting value of carefully preparing such sheets for articularion ofevery phoneme of a patient is; it is often possible to make up words from among the phonemes the patient is able to utter without difficulty and ask him to utter a whole series of them. This simple device will often encourage the patient as well as his parents that he can really gain normal speech and would thus act as a real boost for encouragement willing by continuing their afforts.

For theraphy, this helps in (i) programming the treatment in a detailed personalised way (ii) preparing many types of word lists as per the phonetics of the patient's language and the different types of the

articulatory requirements of the cleft palate and (iii) taking advantage of the phonetic peculiarities that the language of the patient itself affords; instance a Tamil patient can be examined quickly as the phonemes required to be tested are few and secondly using a long vowel prior to a consonant or using the consonant in a conjoint manner (C=C type k.k.) in Tamil seems to aid in uttering the defective consonant after the surgical repair, more easily. With such premises one can foresee the need and utility of preparing several categories and graded series and words in our different languages with their consonants in the IMF positions and even taped lessons of them for home and self drills, specially if the patient is an adult.

Cleft palate is a condition where phonetic studies are very necessary but is usually neglected. For instance, instead of examining his ability to articulate the phonemes of his language rather randomly as at present it is useful to do so in an order of progressive sequence. In Indian languages, this order follows a slight modification of the Paninian arrangement in which we traditionally learn them (Figs. 1 / 2). The disabilities can then be shown to follow a neat order; (i) the nasality due to velopharyngeal deficency mainly affects the vowers and not the consonants, (ii) even among the vowels, /a/ is very rarely nasal, the most frequent nasal vowel is /i/ and its 'derivatives' /i/ and then /e/, /ē/ and /ai/ in this order of descending frequency (iii) the vowel /u/ and its 'derivatives' /ū/ and then /o/,/ē/ and

/or/ are nasalised much less frequently, (iv) nasalisation gets restored following surgery only if /i/ alone is affected; if all the basic vowels /a/, /i/ and /u/ are affected, the chances of regaining non-nasality is remote, (v) whenever a substitution is affected to a basic consonant of a class, it is often likely to be done by the nasal phoneme of its group. /P/ is likely to be substituted by /m/ and so on, if however the substitution is not done by a simple vowel like /a/ or an aspirate like /ha/.

Discussion

If the need of the phonology of the language is so partinent to cleft palate as to lead us to the fascinating idea of commercialising taped lessons of phonetic drills in several languages, the need and utility of the lessons of grammar and syntax of the languages of the patients to the more central disorders of cerebral palsy, delayed language etc. is much more; this however is a more complex issue. We therefore merely high-light the salient points. To help the mentally handicapped with communicative difficulty it is important to note that we now have sufficient technical expertise to develop what is being already referred to as language therapy and not merely speech therapy 13, 14. To appreciate this, we should note that the way the process of language is being evaluated nowadays is quite different from what it was in the past 2, 10. Modern linguistics considers its subject matter more as a biological process created during organic evolution than as just an artifact developed due to

more social conventions. In the analysis of the language material also, whether we consider it as presented to a speaker or produced by him, the discipline of structural linguistics has reached quite a sophisticated degree of fineness that must be understood and utilised.

How does a child demonstrate abnormal language behaviour and how do we develop techniques to observe and analyse it? Cerebral palsy, brain damage, mental retardation and autism are four specific conditions where language difficulties occur in a child. The criteria of grouping abnormal language has so far been to call them auditory or visual modality dysfunctions viz. disturbances in speaking versus reading-writing dimensions. This is being given up now by adopting criteria based on the various dimensions of language behaviour This is to give greater attention to the syntactic or semantic characteristics of the language performance. We than come to the heart of the linguistic act and not merely beg ourselves down in some merely external manifestations of it.

Three definite forms of language problems can now be specifically listed. They are; the disorders of vocabulary, the disorders of sentance structure and meaning, the disorders in discourse and the disorders in pragmatics. In studying each one of these dimensions, considerable progress has been achieved abroad and analytical tests have also been developed. They need to be adopted to our conditions and our languages.

Only one of these dimensions is being illustrated in detail viz. the disorder of vocabulary which is the

simplest of the four-both in its recognisability and manageability. We now have definite techniques to measure this quantitatively. These are Peabody Picture Vocabulary Test and the Full Range Picture Vocabulary Test. An extremely valuable tool that can be applied to all communicatively disabled individuals including the mentally handicapped is; the development of Functional Communication Profile as first formulated by Taylor. This measures the patients ability in 45 separate linguistic skills needed for daily living which permits a score in a continue from 0 to 100 percent, grouped into tasks which make differential diagnosis among aphasia, apraxie, dysarthria and vocabulary, more useful clinically. The importance of utilising such Profiles and how we can go about developing our language versions of this cannot be over emphasised.

The amount of information about the child's knowledge of word meaning gained from these measures depends on the last item and the items that serve as foils viz. the items that are not correct. Only a few processing abilities have been identified as directly related to vocabulary usage. Of these, the best worked out is; the ability of word retrieval. In testing the capacity of word retrieval, focus is on the child's ability to search memory, find and produce the appropr-iate word. The Confrontation Naming Test exemplifies how we can obtain this measure. Picture stimulii are presented here one at a time to a child who then names it. The interval of time (latency) between presentation

offered and the response given is than taken. After this, all the items that the child could not name, are excluded and only those named correctly are presented again; the latency is once more recorded. The change is latency between the first and the second trial is usually evaluated as a meaningful and measurable parameter. Any increase in the latency between these trials is an indicator of a definite existence of word retrieval difficulties.

From research and clinical observation using measures like these, it has become clear that children with language disorders often have vocabulary deficits of some form. These children whose language disorders occur in association with mental retardation will almost always have a deficit in vocabulary. We should emphasise that the child's knowledge of word meaning will always be dependent upon the level of conceptual development. If a child has not developed the general concepts of events that can occur in the future, words such as "tomorrow" or "next month" will not at all have their adult meaning specification to him. Children with mental retardation typically show a slowed rate of conceptual development and this may be one reason for their difficulties with vocabulary development. We shall than have to attempt to stimulate conceptual abilities by offering them diversified sensory experience.

The Present Need

Many other examples of this nature can be given to emphasise the value of taking into consideration of

what is happening in the field of research in linguistics where we now regard language production and reception as definitive and studyable aspects of human physiology. Infact, the time is ripe to develop what can be called Medical Linguistics may, on the analogy of Medical Genetics.

It should be noted however that to develop such a new discipline more rigorously than has been done before and to a degree of sophistication and reliability that the clinical service demands, the attack has to range from theoretical, to technological and clinical levels. A normal speech clinic or even centres specially meant for speech rehabilitation rarely have an inclination to carry out the basic type of research that is required for such advances whose promise is very much salutary. The personnel are considerably and very rightly involved in rehabilitating the patients who come to their care. They are also overburdenned by the pressure of work and the intensity of their own routine clinical demands. That is why they are reluctant to pursue any promising line of activity which however can be expected to yield result only in the future. That is why a definite need for the hour is to encourage such basic research and more over to recognise if such centres of study already exist in our country and augment it fully.

To illustrate the spirit of approach and the technology at our service now available, it is relevant to quote Wepman.[13] "Therapy than requires the utmost

ingenuity, the maximum of innovation and the constant challenge of effecting change. It can never be routine, predetermined or automated. There are no successful orderly steps that apply to all or even to a majority of patients, no cook book approaches of merit". One example of a language therepy technique that has proved valuable was developed by Wepman himself by collecting a widely diverse library of film strips, educational and Vocational, ranging from new arithmetic to archeology. "When the patient is able, we allow him to select a film strip with a little that intrigues him. When he cannot, we select one for him. We ask the patient to view the strip at his own rate of speed, trying to talk in any way he can about what he sees, his speech efforts are recorded and the record played back to him while he views the strip for the second time; his errors are pointed out to him if he does not hear them. If the patient can read, the tapes are transcribed so that he can follow while viewing the film for a third time..... It is this type of nondirected theraphy that we believe to be maximally beneficial to the patient who, as he succeeds will or should be able to speak in any situation without the need for direct overt assistance".

What we should aim in diagnosing the disorder of speech and language is more to explore as to how much of it has remained. It is in as analytical and precise an appraisal that we can make in this regard, the degree of our success lies. For, we than have the full knowledge of the scratch from which we have to build. Linguistic analysis helps a clinician at this state.

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Fig. I PHONEME CHART

The phonemic sounds are indicated in ordinary English alphabets with simple well known discritical marks and not the International Phonetic Alphabet (IPA) as the latter is generally not familiar to the clinicians to whom this paper is particularly meant.

The vowels:

1. The simplest basic vowels:	a (up)	i (it)	u (put)
2. The "corresponding long vowels:	ā (car)	ī (keen)	ū (pool)
3. The second set of the short vowels are: (found in Kannada only and neither Sanskrit or Hindi)	e (pen)	o (one)	
4. The "corresponding" long vowels:	ē (gate)	ō (ode)	
5. The dipthongs:	ai (kite)	ou (hound)	

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The consonants:

a. The classifiable consonants:

1. K-class	k(kit)	kh(khan)*	g(gut)	gh(ghastly)	ng
2. C-class	c(china)	ch(chance)	j(jug)	jh(Jhansi)*	ing
3. T-class	t(tin)	th(kathi)*	d(dig)	dh(dhel)*	n(chana)
4. T-class	t(tapas)	th(thorn)	d(dan)	dh(dharma)	n(nut)
5. P-class	p(pup)	ph(phal)(x)	b(bun)	bh(bhang)	n(mum)

b. The unclassifiable consonants:

y(yarn) r(run) l(land) v(van) sh(shut)

sh(shagrin) s(sun) h(hut)

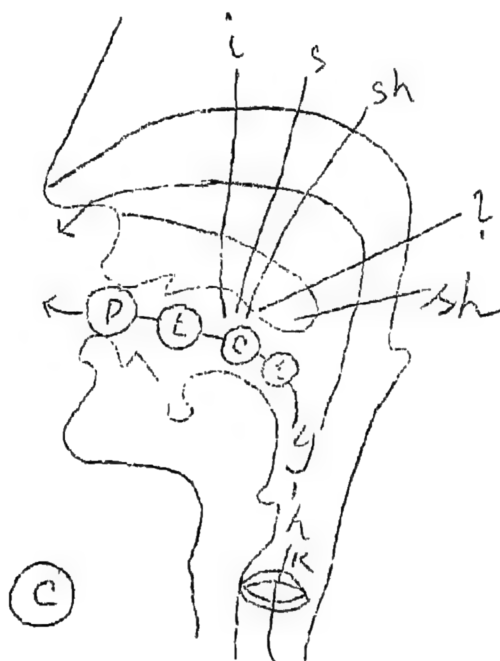
The words with astericks are from Hindi:Khan (a Muslim name), Jhansi (name of a town), Kathi (stack), dhol (a drum), chana (a pulse), tapas (penance), dan (gifts), dharma (righteousness), phal (fruit), bhang (an intoxicant).

Taken from Electrophonograph and Speech by Krishnamurhty K.H. (Indian J Med Res 72, July, 1980, pp 144).

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KINEMATICS		PLACE OF ARTICULATION				
		GOTT.	ANT. PAL.	POST PAL	DENT	BILAB
	GENERATION	K	c	ṭ	t	p
	ASPIRATION	kh	ch	ṭh	th	ph
	SOFTENING	g	ṙ	ḍ	d	b
	ASPIRATION	gh	ṙh	ḍh	dh	bh
	NASALISATION	ng	ing	ṇ	n	m

(A) C_1



(B) C_2

FIG. 3

* NO SPECIFIC PLACE

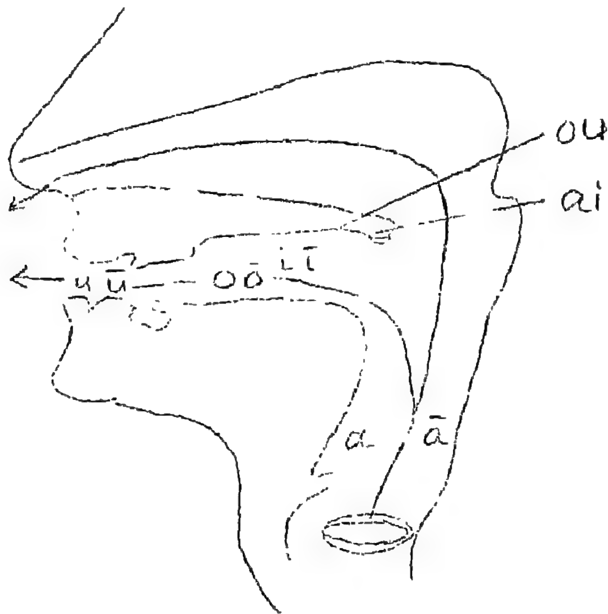
** ANTERIOR BUCCAL CAVITY

KINEMATICS		PLACE OF ARTICULATION						
		ALL OVER *	ANT. **	ANT PAL.	ORAL LAB.	ASPI. (PAL.)	ANT. (PAL.)	POST. PAL.
	GENERATION SOFTENING	yh	r	l	v	sh		
							s	sh
								l

4- CONSONANT KINEMATICS (A)-C1, (B)-C2 'RELATION'
(C) PLACEMENT (BOTH APPROXIMATE)

KINEMATICS		PLACE OF ARTICULATION				
		POST	PO.MEDIAN	MEDIAN	PRE.ANT.	ANTERIOR
	GENERATION	a		i e		u o
	LENGTHENING	ā		ī ē		ū ō
	GLID		ai		ou	

(A)



(B)

FIG. 2 THE VOWEL KINEMATICS
(A) 'RELATION' (B) PLACEMENT
(BOTH APPROXIMATE)

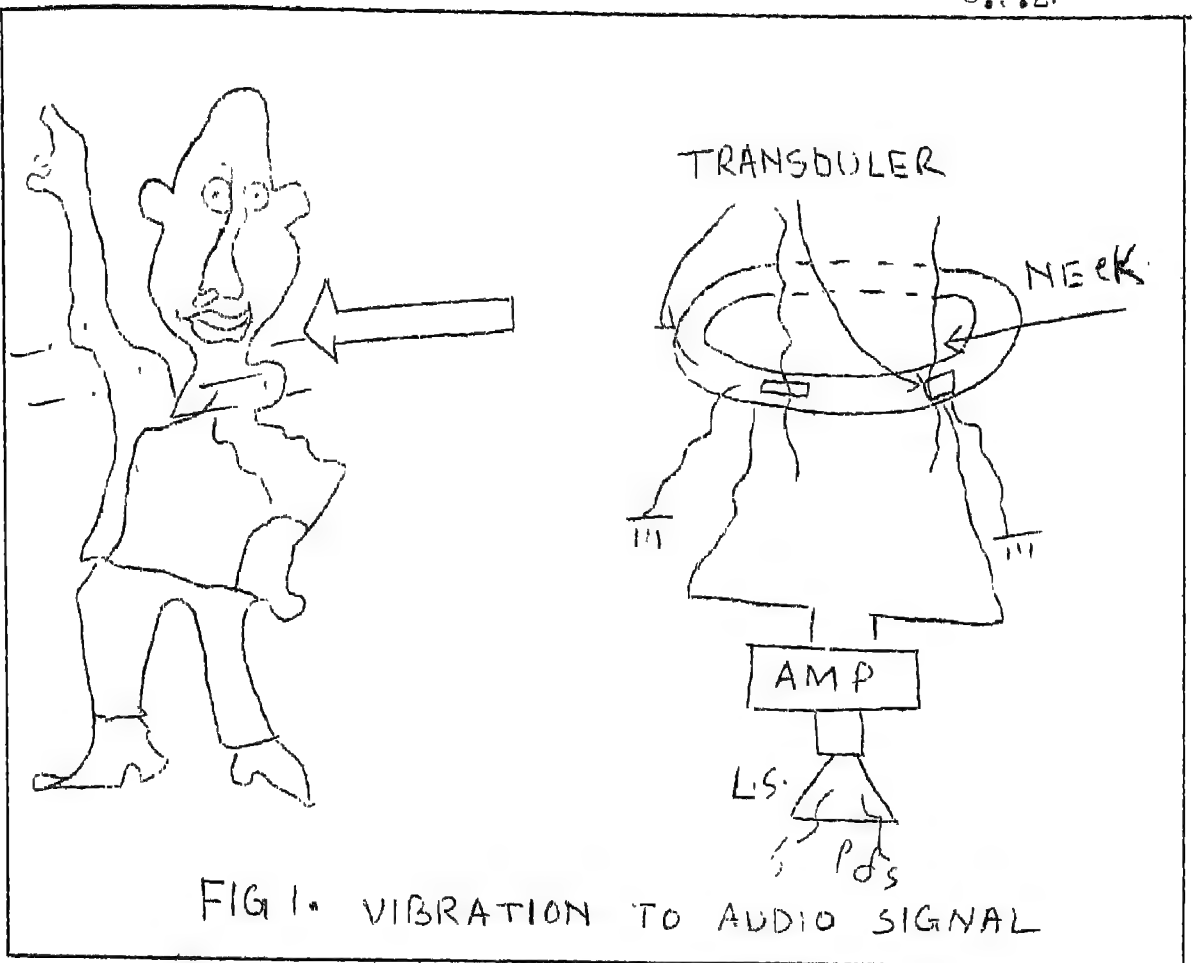


FIG 1. VIBRATION TO AUDIO SIGNAL

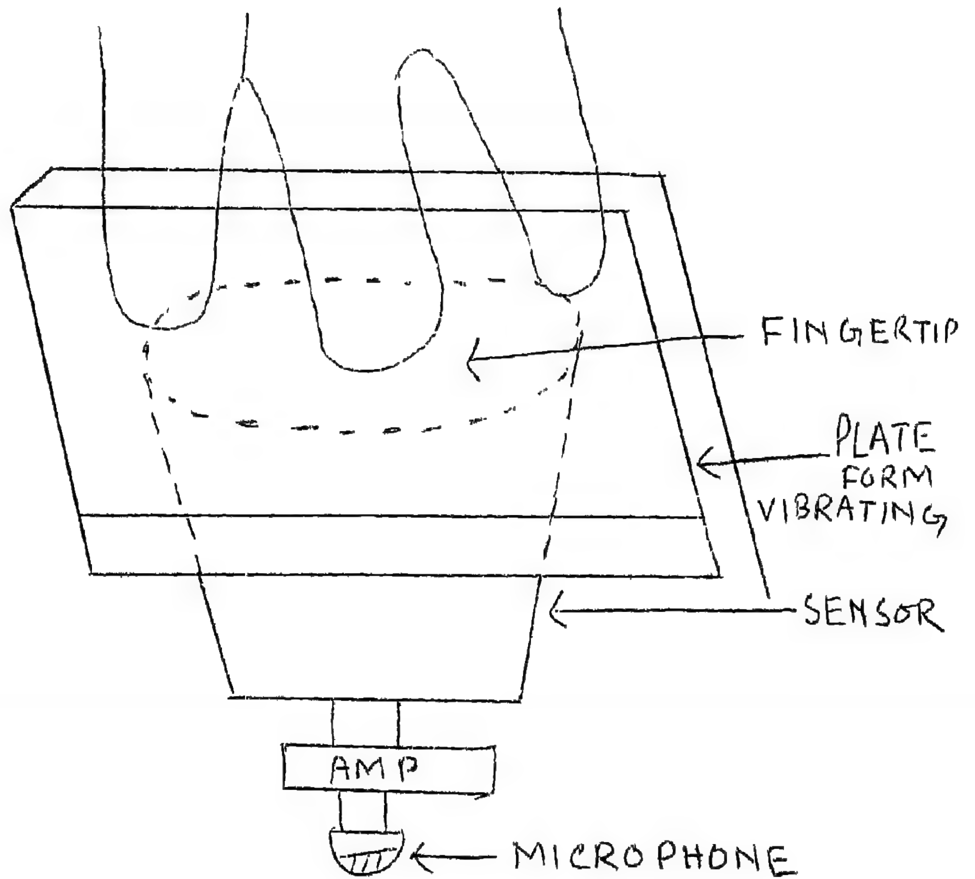


FIG 2. AUDIO TO VIBRATION

3.4.0 PROBLEMS POSED BY HEARING IMPAIRMENT

by

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Abstract

This educational methodology is adapated from the Montessori method of educating young children. Lessons are based on a child's actual experiences. These experiences are talked about in simple, clear sentences as the action takes place. Consciously, each object and each action is named; this is to overcome the lack of word pictures that exist in the hearing impaired child's mind.

The oral pattern is buttressed by written pattern, to give the child a clearer picture. The teacher talks in a natural tone without any over-emphasis. The sentences are simple, complete and grammatically correct.

The ideal age to start learning is from the age of one.

The child uses a good hearing aid, which amplifies the sounds. No hearing impairment is 100%. Every hearing impaired child has residual hearing to a certain degree and aided by the hearing aid, the child hears sounds. With proper auditory training, the child comes to realise that sounds have meaning. In the beginning, the child assimilates words, comprehending their meaning. Slowly, the child ventures to use these words in meaningful situations. This is the beginning of language. This is developed over months by oral means, by reading, by writing.

Oral communication is considered to be firmly set when a hearing impaired child understands a question and meaningfully answers it.

Introduction

Oral education for the young hearing impaired child is the true education a teacher can offer.

Language and speech are the two areas which make a human being specifically different from the other animals. The human brain has precise areas for speech which do not exist in animals at all. However, intact is this part of the brain in a human baby, still the child cannot speak unless it learns a language. Genetic memory does not play any part as far as language development goes.

The human baby has immense capacity to learn a language between the ages of zero to five. As the child grows older, this capacity gets atrophied and it has been proved that a child left without learning a language untill the age of thirteen will almost never be able to learn a language for the rest of his life.

The human brain is not a computer that follows routines laid down at birth. The brain of a new born infant has enormous capacity to learn. It registers hundreds of impulses each day of its life and these prepare the child for future actions.

The day the hearing impaired child is born, he is not in any way less capable of learning than a normal hearing infant; excepting his sense of hearing, the others senses are stimulated by the actions that take

place around him. He embarks on comprehending the world around but due to his hearing impairment the things and actions he visualises and perceives are not named for him. His hearing impairment puts him into a very tough situation. As he does not hear the sounds around him clearly, he is deprived of the security that peoples' voices may give him even when he is not next to his mother. He cries like his hearing peers, when he is in need, but completely misses the clues given by sounds. The soothing words of the mother, the tingling of his feeding bottle etc. are not heard by the child and he becomes an outsider in his own family.

Even though the hearing child starts talking only by his 12th or 15th month, the child would have heard hundreds of sentence structures in meaningful situations. The child has been in the process of assimilating the language he has heard and had been waiting for the signal from his brain to start uttering these heard patterns. As the hearing impaired child has not heard anything at all so far there is absolutely no word-picture in his mind which can set him in the path of speaking.

He may have perceived a number of incidents that had happened earlier but as no words or sentences about them were heard by him, there is no fund of language in his brain which alone can set him in the path of oral communication. His auditory memory had been nil making his language development a blank frame into which nothing

has been woven. His hearing impairment deprives him of the human commitment to "Speak and understand speech".

The tragedy of deafness is not that the child does not speak but the child has nothing to say.

II. Pre-Requisites for a hearing impaired child to develop his full potential.

There are many factors that influence the character and personality of a hearing impaired child. A few of them are crucial for the total development of the child.

Early training is the foremost pre-requisite. The earlier the training is started, the better are the results. More than 60% of what an adult of thirty years knows is based on the infrastructure that he had built before he was five years old. The important basic concepts are all learnt by a human child even by the time he is three years old. His brain is most receptive at this young age and the best period for language development in the child is found to be made to utilise this important learning period. Formal training can be started from the age of 9 to 10 months onwards when the child will be able to sit-up.

A continuous auditory training is the backbone of the training. Auditory training is not just a part of the training imparted to the hearing impaired child, but it is the pedestal on which the whole education of the hearing impaired stands. Language development, speech, clarity and comprehension can progress to the child's maximum capacity only when constant effort is done by the school as well as home, to exploit the residual hearing left in the hearing impaired child.

It has been proved that only one child in a million will have a total hearing loss not to be able to make use of a hearing aid; every other child is left with some residual hearing. The hearing loss in these children ranges from 30 db to 120 db, grouping them into three distinct groups - children with mild loss, moderate loss and severe loss.

In children this residual hearing atrophies very fast. A child with a severe hearing loss may end up as a child who has only a moderate or mild loss if the child gets proper early training. A child who might have had only a moderate or mild loss at the age of two, if left untrained upto the age of five or six, will react and behave as a child with severe loss.

The child's intelligence and attitude also plays a very important role. The hearing impaired children are not specially bestowed with artistic talents or prominent observational skills as may be imagined by many. The hearing impaired children are exactly alike ordinary children in that a major portion of them have normal intelligence. A few of them have intelligence above the average and a few other fall in the group of children with intelligence below the average.

Hearing children who are near or slightly below the lower border of intelligence do not suffer any great damage. Though these children do not shine academically and otherwise, still they lead a normal life. But a hearing

impaired child with intelligence below the average level, finds it very tough. Similarly, the slow learners, shocked babies and damaged children who also have a hearing impairment do not develop language easily.

Parent Guidance forms a very important aspect of the teaching programme. The whole language scheme is spun around the actual experiences of the young hearing impaired child. It is imperative that the parents with whom the young child is emotionally attached also take an active role in supplementing the school's effort in providing the child, then and there, with the appropriate language patterns. As the parents are amateurs and also desolate, the school guides them properly, thus making the education of the young hearing impaired child a meaningful expedition.

Thus a hearing impaired child, with normal intelligence, can develop his full potential if the training is started early. Backed by good auditory training and home support he blossoms into a well-balanced personality equal to his normal peers.

III. Educational Methodology For Hearing Impaired Children

Introduction

This methodology is based on Montessori methods used in teaching normal young children, with necessary adaptations needed to combat the hearing impairment in the student. The basic principle is harnessing all the

sensory perceptions of the young child to give him an integrated knowledge of the world around him.

The children are helped to play, experience, observe and learn. As the children are very young, care is taken to engage them in constructive games. The materials used are simple - building blocks, puzzles, marbles and toys that create situations to talk about. An informal, friendly atmosphere is maintained in the classroom. For example, the teacher and students play noisy games, as a dog and puppies, as trains etc.,.

The children are carefully guided to use those constructive games, imbibing ideas of colours, shapes etc.,. These children are fitted with hearing aids that fit them properly. The teacher talks to the children all the time. The child is encouraged to "listen" from the very first day of his training. Thus slowly the child becomes aware of the sounds. The names of the toys he plays with are introduced next; he is made aware that each one of them has a name; the people who move closely with the child, the things he uses in his daily life etc. are named one by one. A pictorial record of these is also maintained for recapitulation.

In the beginning, the child is bewildered, but soon begins to learn. In this stage of assimilation, he learns to look at peoples' faces whenever any one talks, he tries to lipread as well as listen and tries to comprehend what the person is saying; eventually the child is able to associate words and objects. This is

the first step the child takes towards language. Gradually he is able to comprehend small oral commands like "Open the door", "Fetch me a pencil" etc.,. The child is also encouraged to vocalise.

Stage I

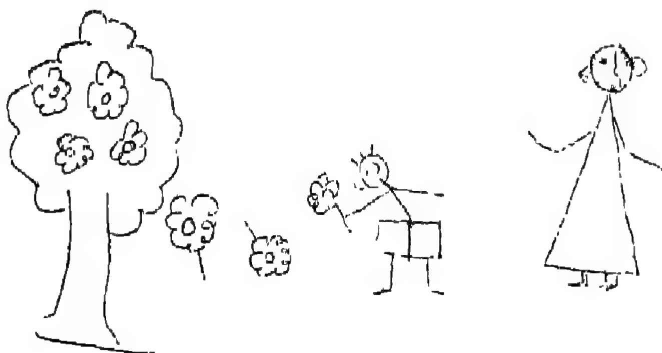
Formal lessons are started once the child is familiar with a considerable amount of names of things around him.

In this project method, the child undergoes an experience under the supervision of the teacher who explains the activity as it proceeds, thus providing necessary words for the actual experience.

ACTIVITY

Example

The child is taken in the garden. He is shown a tree full of flowers. He is shown the flowers that have dropped on the ground. He is asked to pick a flower. The lesson for the day is :



Ram picked a flower.

The teacher reads the lesson with the child. The whole activity is recapitulated in detail. The child is encouraged to read the lesson. Simple questions like "Who picked a flower?" "What did you pick?" are asked. The child has to be helped in the beginning to understand the whole idea of question and answer. Thus foundation is laid for logical thinking and conversation.

Auditory training is given from this stage onwards. The child is encouraged to listen only through the hearing aid (not look at the speaker's face) and answer questions, point to particular words in a sentence.

Each day's lesson is based on a fresh experience of that day. Full sentences are presented from the beginning. A written pattern is also presented to supplement the auditory pattern. The hearing impairment necessitates repetition. Simple sentence structure are adhered to in this stage. Assimilating the correct sentence structure is a very difficult step for the child. The child's residual hearing is exploited to the maximum, he is encouraged to listen consistantly.

Thus at every turn, an auditory and visual pattern is presented about an actual experience of the child. So the child learns to translate experiences into words and concepts. Gradually the lessons grow upto five or six sentences.

Stage II

Now the child can easily say simple sentences of his own. His lessons are still based on his experiences. But more is expected of him orally. He is able to answer in simple sentences questions pertaining to the activity, even if those actual sentences do not find a place in the lesson. The child is able to narrate an experience in two or three simple sentences.

Now his lessons are written in a different pattern. Now the aim is to develop on idea of acquence, an idea of cause and effect. The lesson is written on strips of paper, each containing one sentence. The sentences are put in the right sequence and read by the teacher. Then the strips are jumbled up. The child puts them in the correct sequence and reads them.

Example :

Ram went in the garden

Ram saw some flowers



The flowers were on the ground

Ram picked a flower



Ram smelled the flower

The flower had a nice smell

Apart from this regular lesson, picture books and charts are used as talking points. The child is absorbing a rich fund of information. Basic concepts of Biology, Zoology, History, Geography etc., are imbibed by the child. The child is beginning to collect and assimilate information beyond his actual experience; stories and songs stimulate his power of imagination.

Stage III

Now the lessons are packed with more information, the actual experience being only a starting point. Reading and writing are actively encouraged. The child is expected to form questions of his own. He makes use of his over-widening vocabulary in his daily conversation.

His general knowledge and his reading level are above that of his hearing peers. He holds a conversation easily on any pertinent topic, fully utilising his residual hearing. The child can write an essay of 10 to 15 sentences on an event he has witnessed without his teacher's help.

Now the child is ready to leave the sheltered atmosphere of the special school and be placed in a suitable class in an ordinary school.

Stage IV

This is the final stage where there is a close follow up over the child that is placed in an ordinary school. In the first year, the child comes in the afternoons to the special school, where he is given auditory training and continuing training in speech and reading. Academically, the child needs no special help; in fact he is ahead of his hearing peers. This advantageous margin is kept up by extra reading. Slowly this follow-up is lessened in the next two or three years as the supplementary help of the special school to the hearing impaired child is not essential any more.

CASE HISTORY

Case histories of three hearing impaired children are presented here.

Case A is a child with no extra problems other than her hearing impairment. She was able to leave the special school after a period of three years.

Case B is a child with a very heavy hearing loss who would not have developed any language skills even if one more factor had gone against her. She was able to leave the special school after a period of five years.

Case C is a child with behavioural problems. He shows all symptoms of being a rubella baby. This child needed four years to become a willing worker, to learn to give his best. Then he left the special school. Still, behaviour problems persist though less frequent and less serious.

CASE A

Hearing impairment in the child was suggested by the mother even at the age of one year. The child started using a hearing aid from the age of eighteen months with the help of correspondence lessons to parents of young deaf children from John Tracy Clinic U.S.A. and the mother tried to teach the child at home.

The child was admitted to the special school at the age of two years and eight months. By then she had accepted the hearing aid and was using it almost right through her waking hours. Her language development and vocabulary were nil at the time of admission into the school. Her audiogram showed the hearing threshholds around 50 db.

The child is the 2nd child with an elder sister.

The child was found to have intelligence above average.

When the child joined the school she was wrorried, aloof and shy. She did not accept the other children easily; during the first six months at school, she did not cooperate with the teachers.

After six to seven months there was a sudden change in her. She showed keen interest in her lessons at school; she tried hard to please her teachers; she was slightly better with other children in the school.

At the end of the first academic year, the child was already talking in phrases and very small sentences. She enjoyed using the new tool she had acquired. By now

she was much relaxed at school. The mother told us that at home the child was happy and cooperative but still avoided all visitors and strangers at home.

The next academic year proved a fruitful one. The child showed specific interest in learning new words, phrases and sentence structures. She used them orally at every meaningful opportunity. Her reading also improved tremendously.

While she showed steady improvement academically, she was already conscious of her hearing impairment; She was upset about the hearing aid. There at school and the home guided her gently and help her understand that her hearing aid will have to be her constant companion; in a year's time her attitude improved and she slowly started accepting her handicap.

During the third academic year the child made tremedous progress. Her language and speech developed with great speed; her reading and general knowledge was already beyond her age. She was healthily sensitive to criticism and tried hard to do her best in fact, made genuine effort to improve herself.

Considering all these assets, the school decided to send the child to an ordinary school part of the time. She was then six years old. She joined in the Ist standard of a regular school. The other children in her class were of her own age. She went to her new school in the mornings and came to the special school in the afternoons for training in language skills.

The academic work load at her new school was very light considering this child's attainment. She easily got integrated in her new school. She went to it happily.

The whole of the next academic year the child came to the special school one afternoon a week. She coped well at school; she had developed good reading habits and her reading age was well ahead of her chronological age.

Then the father got transferred to another city, so the child had to change to a new school. She was soon well adjusted there also. The child's language, speech and temperament progressed steadily and was confident and composed.

CASE B

Hearing impariment in the child was suspected by the parents when the child was 12 months old. A hearing aid was used off and on since then. Regular training at school was started when the child was 22 months old. The child's audiogram then indicated a hearing loss of about 120 db.

The child was adjudged a very intelligent child by the child psychologist and the I.Q. was estimated at around 110.

Third child at home with a boy and a girl older to her. At admission the child was found to be very reserved, worried and too mature for her age.

The child was put in a class of 3 children; the other two children had moderate hearing loss. The child was treated the same way the other children were treated.

In three months time the child got used to her classmates; she appeared happy. She gesticulated a lot. Which she was discouraged from doing and was guided by being provided with necessary words and sentences. A small concession was given to the child. The teachers talked only about things that happened around her and not about previous incidents or future happenings.

The child's comprehension improved but she was absolutely silent. More time was spent with her, by teachers, playing noisy games, using toys that made noises of different frequencies. Every attempt was made to stimulate her hearing.

At the end of the Ist academic year the child was able to comprehend simple sentences orally. The child was not silent any more. She ventured a few sentences of her own. But her speech contained only a very vague vowel pattern.

The parents were alerted not to make exaggerated lip movements. More time was spent by teachers inplay, encouraging the child to vocalise more and more. Care was taken by the teachers to keep their speech in simple sentences. The child remained aloop; she did not mix with the other children at all.

At the end of the second academic year the child showed a steady improvement regarding comprehension but her speech pattern remained very poor. Effort was made to sustain the vowel patterns in her speech. Academically the child was progressing. She was able to understand abstract

ideas by now. She was not discouraged even when she produced uncontrolled vocal patterns. She was still encouraged with noisy toys and games.

In the third Academic year the child made considerable improvement. She revealed an excellent memory for written forms. She improved temendously in auditory exercises. Her behaviour also improved. She became friendly with all the children at school. She was very confident and accepted her teachers. At the end of the 4th Academic year the child was found to have progressed in all aspects. Her language was good; she was able to talk fluently on any subject in keeping with her age. Her voice was natural but consisted mostly of vowels. Her reading was good, infact much above her age.

The child questioned everything; she was eager to learn new ideas and concepts. She questioned every idea and would not get convinced easily.

At the end of the 5th Academic year the child had very good language with well set grammer and a good vocabulary. Her reading steadily improved and was able to listen with full attention. Her self confidence continued to be good.

In the beginning of the 6th Academic year, the child was sent to an ordinary school for half-a-day. She joined in Ist standard of a regular school. The other children in her class were younger to her by one or two years.

The child came to the special school every afternoon.

The child showed an all round deterioration for the first few months, she became quiet and slightly worried. But slowly and steadily she got over this set back. By the end of the academic year she was almost completely relaxed; she had made a few friends at her new school; she was regaining confidence. Her academic pefformance at the regula school was quite good.

For the next two academic years the child attended the special school one morning in a week; the child showed a steady progress all-round. Her academic performance in her regular school had improved. She stood first in her class in all subjects. She was at ease in her class. The special school decided that a regular follow up by them was not necessary hereafter.

Though her speech is still not clear in that it does not contain many consonants; but her speech has good rhythm and intonation. Her voice quality is natural and good. She is able to manage on her own at school, in places like libraries, shops, friend's houses etc.,. Her temperament is pleasant, she has taken her handicap in the right spirit.

CASE C

The defect was noticed in the child when the child was around 12 months old. The child was fitted with a hearing aid. Hearing loss was found to be around 70 db.

The child was a premature baby. His general health was not good. He was underweight. His food habits were very poor. But child was found to be quite intelligent.

The child joined the special school at the age of 24 months. Though he had been using a hearing aid almost throughout his waking hours, he had not developed any language skills.

At the special school he was friendly with his teachers. He showed interest in learning; he picked up fast and worked hard. At the end of the first academic year, the child was already talking in phrases.

The second academic year at school was smooth. His language skills improved steadily.

But his temperament was not amicable. He did not make friends with the other children at school. He was not sensitive to praise or punishment and did not make any special effort to please his teachers.

The school found it tough to handle him during the third academic year. He was indifferent to everyone but still was doing well academically.

The fourth academic year at school proved a big challenge to the teachers. It was more and more difficult to get the best out of the child. But when the child was in a good mood on a particular day, all went smooth.

At the end of the fourth academic year, it was felt by the school that the child's language development and skills in speech were good enough not to need any further help. But his behaviour was still unpredictable. As an experiment, the school sent him to an ordinary school.

He went into a class of thirty hearing children of his own age. His language, reading and general knowledge, of course, were much above his classmates.

The child reacted tremendously well. He took up this new challenge with great enthusiasm. He tried to impress his new teachers and friends.

He came to the special school on all afternoons for one year, two afternoons for the next year and once a month thereafter. No special problem was noticed in him.

Now his reading is good. He is doing well at school and is confidentally moving around outside. Still there are days when he suddenly goes off his moods. These occasions are getting less frequent.

CASE	AGE AT WHICH TRAINING WAS STARTED	PARENT RESPONSE	DURATION	COMMENTS
A	5+	Good	2 years	Mild hearing loss - Helping factor
*B	2+	Excellent	3 years	-
C	4+	Excellent	3 years	Temperament - Helping factor
D	2+	Good	3 years	-
E	5+	Excellent	3 years	Excellent Temperament - helping factor
F	4+	Good	3 years	Mild loss - helping factor
G	3+	Fair	3 years	-
H	3+	Good	3 years	-
I	4+	Excellent	3 years	Temperament - helping factor
J	3+	Good	4 years	-
K	3+	Fair	4 years	-
L	4+	Excellent	4 years	-
*M	2+	Excellent	4 years	Temperamental inadequacy - delayed the progress.
*N	1+	Good	5 years	Severe hearing loss - delayed the progress.
O	2+	Fair	5 years+above	-
P	3+	Fair	5 years+above	-
Q	3+	Poor	5 years+above	-
R	2+	Poor	5 years+above	-
S	4+	Fair	5 years+above	-
T	2+	Negative	5 years+above	-
U	2+	Negative	5 years+above	-
V	3+	Poor	5 years+above	-
W	2+	Negative	5 years+above	-
X	4+	Fair	5 years+above	-

*Children mentioned in the case study.

3.5.0 - VIBRATOR TRAINING: AN APPROACH TO MODIFY THE SPEECH SKILLS OF PROFOUNDLY DEAF CHILDREN.

B
Y

D. VASANTA.

ABSTRACT

A single nine year old profoundly deaf subject was trained to identify a number of speech cues using a single channel vibrotactile transducer. Amplified low pass filter speech was conveyed to the palms and fingures of the subject. Speech reading was not permitted. Correct responses were reinforced on a fixed ratio schedule of FR 7. Verbal stimulus "wrong" followed incorrect responses. At the end of sixty half an hour sessions, the subject could identify the number of syllables, syllable length (long vs. short) stress or emphasis on syllables and certain intonation patterns of sentences. She could also distinguish bilabial plasives from non-plassives and recognize them in words even in an open set recognition task. Results were found to be consistent with those of some recent research in vibratory perception of speech. They seem to suggest that wearable vibrotacticle aids may help profoundly deaf individuals perceive time-intensity aspects of speech better than hearing aids currently available in market. There is an urgent need for further research in this area. A tentative program of vibratory training has been outlined for profoundly deaf chilfren whose native language is Telugu.

INTRODUCTION:

In the battle of commonly used methods of rehabilitation of deaf individuals, vibratory triaining did not find a prominant place. Despite the fact that profoundly deaf individuals, whose hearing loss exceeds 95 decibles in the speech frequency range benefit very little from auditory training, educators continued to use hearing aids. Over the years, speech reading fingure spelling and sign language have been the most widely used methods in the rehabilitation programms. As long ago as 1951 Bekesy pointed out the similarities between the skin and the ear. The first single channel vibrator was built in the 20's by Gault. The later modified version of the same device was named Teletactor (Gault 1928). Today, computer models are available into which are built as many as one hundred and forty four tiny vibrators (Sherrick, 1975). The technological progress is great indeed! But none of these aids can yet be considered practical for use in the class rooms. A number of questions related to design options, stimulus variables instructional strategies, methods of evaluation of progress etc., remain unanswered or perhaps unsatisfactorily answered. After making an extensive review of research in tactile speech perception, Kirman (1973) commented that neither the contemporary theories of speech perception nor the results of previous work on tactile displays of speech offer reasonable grounds to believe that skin lacks the capacity to comprehend speech altogether. The passimistic remarks of certain researchers regarding skins

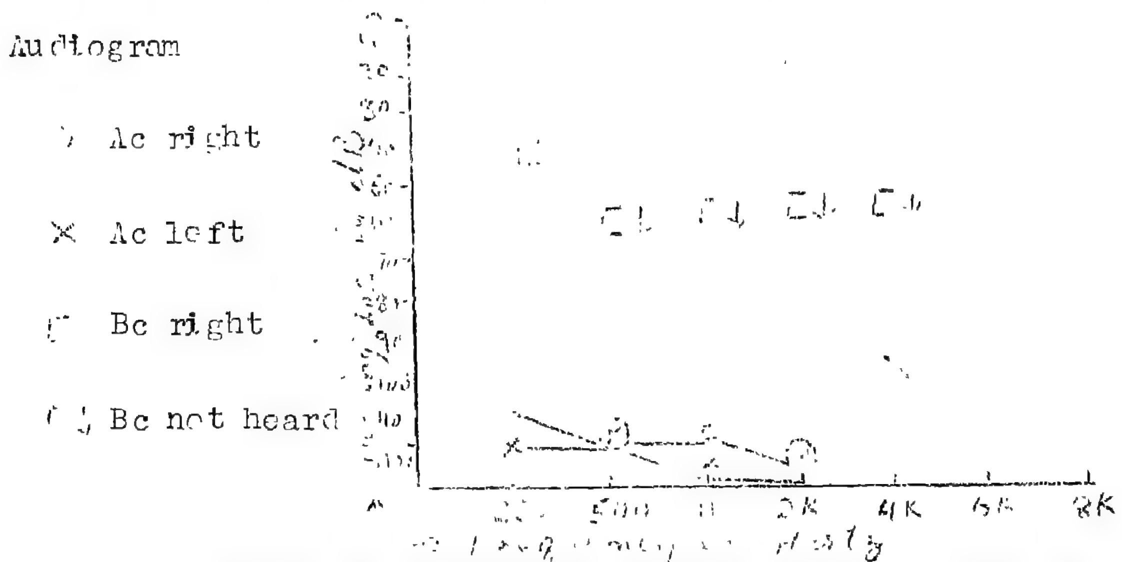
capabilities only reflect the growth in sobriety with which tactile communication of speech is being viewed, contends Kirman (1973). He says that skin has a natural capacity to detect patterns which are shifted over its surface. If factors like stimulus configuration and tactile memory are given due consideration in planning the experiments, vibratory training may yield promising results.

In the recent years, Audiologists and educators of deaf are increasingly becoming aware of the fact that a group of deaf children, often referred to as profoundly deaf, do not actually hear the amplified speech but perceive it through the vibrotactile receptors in their external and middle ears. (Erber, 1974) Not only do puretone thresholds exceed 95 decibels in the speech frequency range, the SIL sensitivity of their ears and the vibratory thresholds from their skin resemble, with a maximum sensitivity between 250 and 500 Hzs. (Verillo, 1962). Risberg (1974) demonstrated, empirically, that the frequency discrimination ability of this group of children is very poor compared to other groups and normals. In speech detection experiments, they perceive only time-intensity aspects of speech, which is again a characteristic of vibratory perception (Erber, 1972). It is this group of deaf children, who may benefit most by vibratory training. The present study describes the variety of speech cues that were available to the skin of a nine year old profoundly deaf child. Based on the preliminary results of this study conducted at the Department of

Linguistics, Osmania University, Hyderabad a tentative program of vibratory training has been outlined for was with profoundly deaf children, whose native language is Telugu.

M E T H O D.

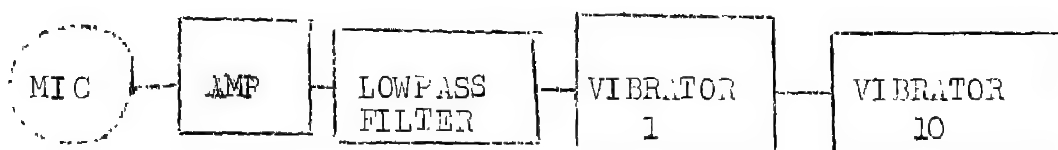
Subjects: A nine year old congenitally deaf female child served as subject in this study. Her problem has been diagnosed as bilateral profound sensori-neural hearing loss and delayed speech and language. Her low frequency average threshold for puretones was 112 db in the right ear and 116 db in the left ear (Fig.1)



Impedance audiometry revealed normal middle ear function. In speech detection tasks on 27 channel selective auditory filter amplifier (product of Institute of Experimental Phonetics and Speech Pathology, Belgrade, 1955) her performance was very poor. Even when the output was 120 db, she could perceive only certain backvowels like 'u' and 'o'. Her lip reading ability, was very good compared to other groups of deaf children. Prior to starting this experiment, she has had three years of speech language therapy.

Instrumentation:

Fig. 2 displays the black diagram of the apparatus used in this study.



This unit, consisting of an unidirectional microphone, an amplifier, a low pass filter which cuts off all frequencies above 500 HZs and a set of ten vibrator boxes was built at the Institute of Experimental. Phonetics and Speech Pathology, Belgrade, Yugoslavia. It has been used extensively by Kostic and associates since 1955.

Stimuli: The words, phrases and sentences used in the present study were mainly derived from the conversational speech and were tested for familiarity. Those stimuli which elicited correct and spontaneous responses from the subject were retained and the others were excluded. There were six monosyllabic words like "ra" (come) "po" (go) etc., about fifty disyllabic words some with trochaic stress (eg. "nadi"-(river) and the others were spondees ("akka"-(sister) or "aku"-(leaf)). The fifty trisyllabic words belonged to three different categories Viz., CV CV CV type ("parupu"-(mattress); CV CCV CV type ("pittalu"-(birds) C CV CV type ("kakulu"-(Crows). There were four different types of tetrasyllabic words and very few polysyllabic words. The phrases and

sentences were either statements carrying neutral or angry mood and request type questions.

Experimental Procedure.

The testing took place in a reasonably quiet room. The subject sat in front of a table containing vibrator boxes at a distance of about 2 ft. from the experimenter. The placed the palm and fingers of one hand on one vibrator and those of the other hand on the second box. She was asked to move the fingres constantly. Stimulii were read by a native speaker of Telugu. An inter-stimulus interval of 4 seconds separated two successive stimuli. According to Bekesy (1959), the time required for a tactile stimulus to produce its full subjective sensation is greater than a second. Similarly, longer time is required for a tactile sensation to disappear completely after it was switched off. The 4 seconds interval wasthought to be a compromise between relative slowness of skin in temporal resolution and the limited tactile memory. After the task was explained to the subject giving examples, the experimenter presented the stimuli in the absence of visual cues. The verbal/non-verbal responses given by the child were immediately noted on a data sheet, designed for this purpose. There were four main tasks.

1. Recognition of number of syllables and syllable length
2. Recognition of stress or emphasis on syllables
3. Recognition of intonation patterns
4. Recognition of bilabial plosives.

For recognition of 'number of syllables' task, after the stimulus word was presented, the subject was asked to indicate the number of syllables she perceived by raising correct number of fingers. In recognition of length of syllables, she had to give non-verbal written response; "-" for long syllable and "." for a short syllable. Thus the word "nadi" was represented as ".." and "Gali" as "-." by the subject. Several hours of practice (without vibrator) preceeded the experiment. Stimulus word was repeated at the request of the subject, occasionally. She was given an immediate feed-back of the correctness of her response. This was done to maintain her attention level as high as possible. Response was modelled when the child failed to give correct response. After 2-3 trials test procedure continued. A random sample of her responses are displayed in the matrix cells below:

Figure.3 Sample responses of the subject in recognition of number of syllables task.

Stimulus

	1	2		3			4		
		2	3	2	3	4	2	3	4
1	"ra" (come)								
2		"nakka" (fox) "caku" (knife)		"alalu" (waves)					
3			"mida?" (Is it yours?)		"pittalu" (bird)	4		"erraa-ngu" (red colour)	
4						"kavala?" (do you want?)			"kalla-jodu" (spect-ales)

The response is matrix cells are to be interpreted as follows; In cell-1, the monosyllabic word is "ra". It was perceived as single syllable vibrotactually also. In cell-2, Col.2, the di-syllabic word is "nakka" (fox) which was perceived as 2 distinct syllables; but in the word "mida?", another disyllabic unit was perceived as trisyllabic unit. Similarly, trisyllabic word "alalu" in cell 3 was felt as disyllabic and tetrasyllabic unit "erra rangu" (Cell 4) as trisyllabic word and so on. There was some confusion in reporting the length of syllables, especially the tetra and ploysyllabic words which will be discussed, later. In addition to these identification experiments, subject's discrimination was also tested in a closed set task. Two words were shown to her; experimenter uttered one of the words, subject had to point to the correct one based on the length and number of syllables she felt.

In stress recognition task, subject had to tap the table as soon as she perceived the difference in magnitude of vibration. Prior to starting the experiment, she was given several demonstrations where stressed syllable (long vowels and geminated consonants and aspirated syllables) were contrasted with unstressed ones and she was made to feel the difference. Later, in a closed set recognition task she was asked to discriminate the word "gadi" from "Gaddi" or "Uppu" from "Upu" etc. She was reinforced on a fixed ratio schedule of FR 7. Experiment

terminated when she gave a criterion response of 90% or more correct on disyllabic and trisyllabic words. The intonation recognition task was also a closed set task. The neutral patterns were contrasted with angry patterns, statements with questions and neutral statements with request type sentences. After the stimulus was presented she was asked to point out to the correct sentence.

In the course of the experiments described above, it was felt that bilabial voiced as well as voiceless plosives have a distinctive ibratory pattern compared to other classes of consonants because, every time a word began or ended with these plosives the child would express through gestures that the membrane hit hard against her palm and fingers. Series of di-syllabic and tri-syllabic words were collected, some of which had these phonemes and other which did not. Child had to say "undi" when she felt the plosive. For instance word "nalli" (bed bug) was contrasted with "balli" (lizard). Similarly the "arupu" (yell) with "arugu" (cement bench) criterion response was correct 90% or more bases correct. In order to see whether the child would be able to perceive the actual position of these plosives in words, word "lipi" (script) was contrasted with "puli" (tiger). Subject had to raise one or two fingers indicating the syllable in which bilabial plosive occured. Later on, the same procedure continued by presenting stimuli in an open set, for eg., the stimulus string was agu - apu - anu - aku or balu - kalu - ralu - calu. The expected response was 2 in the first string and 1 in the second string.

Results and Discussion:

There are very few meaningful monosyllabic words in Telugu. The data based on the limited stimuli indicates that these words have distinctive vibratory pattern, a single energy burst. Subject could distinguish them from di-syllabic and other longer units very easily. She gave criterion response within five sessions. Unlike the subjects of Erber (1974), the subject of this study did not perceive any of the di-syllabic words as monosyllabic. For instance, the strong-weak pattern of trochaic word "lemon" was felt as one single energy burst by his subject. Similarly the word "laura" which had two syllables was felt as consisting of one long syllable vibrotactually.

A trachiac word "ca ku" (knife), which has a typical strong-weak stress pattern was correctly perceived as having 2 syllables but a spondaic word "mida?" (is it yours?) in which the second syllable receives either equivalent stress or secondary stress compared to first syllable was perceived as a tri-syllabic word in which the second syllable with geminated consonant was considered as a di-syllabic word, probably because of the emphasis it received. Prabhakara Babu's (1977) mingographis studies have shown that a syllable is stressed/emphasized if it has a long vowel or a geminated consonant an[illegible]native speakers of Telugu employ these strategies when they want to emphasize certain lexical items. The duration of closure (hold) was found to be much longer when the word "pacci" is emphasized

than when it is not. Also, while the duration of held for a word like "madi" was 0,05 sec., for "maddi" (dirt) it was 0.15 sec., and for "maddi" with extra emphasis it was 0.25 sec. The duration of hold for a short vowel in "padi" (measure) was 0.1 sec., and the same for a long vowel "padi" (diary) was three times that for short vowel or 0.3 sec. This empirical data on emphasis in Telugu might explain the errors in vibratory perception noticed in the present study,

Generally, it is the first syllable of a word that has the main accent, in Telugu. In words of more than f ur syllables, which are not compounds, the secondary accent is rarely noticed (Sitapati 1935). In the preducation of tetra-syllabic word 'tiragali' (grinder), only the first syllable is stressed. The consonant vowel combinations in the rest of the syllables have neither a prolonged vowel nor a geminated consonant. It is possible that these three syllables did not carry distinct vibratory patterns and all that the child could feel was a strong-weak pattern. So she reported it as a di-syllable sord (see Fig.2).

The final syllable of a Telugu word is generally unaccented, but if it is a significant particle as in "Kani" (Let it happen), the secondary stress may fall on it (Sitapati, 1935). In the tri-syllabic unit "Kavala?" (Do you want?) all the three syllables have equal amount of emphasis. The duration seemed to have influenced vibratory perception, because the subject felt this word as a tetra

syllabic word. Vowel duration was found to be significant in perception of stress in English also. Changes in vowel duration ratio can swing listener's perception (auditory) of stress from first syllable to the second syllable in a di-syllabic word (Fry, 1959). This explains why the subject could perceive (tactually) "kavali" as three syllables and "kavala?" as four syllabic word. In a closed set task she could very easily distinguish similar words.

The tetra-syllabic word "kallajodu" (spectacles) was felt correctly but a similar word "erra rangu" (red colour) was felt as tri-syllabic word. Same was true with "tella langa" (white skirt), Similar results were reported by Erber (1971 a) Martony (1974 a) Zeiser and Erber (1971), whose subjects experienced great difficulty perceiving, words like "railroad" hammer, running etc. In all these cases, voiced continuant consonants /l,m,n,r/ were at syllable boundaries and they seemed to have merged with one another. The result is each syllable which could be heard distinctly did not carry separate energy burst and the child might feel two or three different syllables as one very long syllable.

As far as the length is concerned, the child could respond correctly and consistently with most of the disyallabic and tri-syllabic words but not so with longer units. Specifically, she had no difficulty reporting the duration configuration of syllables in words like "nadi" (River), "mugguru" (three) etc., but word like "galimara".

"nanna garu" were erroneously reported. The word "gali" (wind) when uttered naturally was felt by her as di-syllabic word but when the vowel "a" was intentionally prolonged she reported it as a tetra syllabic word. It was true with several other similar words. This finding, along with other findings discussed so far emphasises the fact that duration is one of the important parameters in vibratory perception.

The vibratory cue for stress or emphasise seem to be magnitude of vibration (force with which the membrane vibrates) which is more for stressed syllables. The subject gave criterion responses on the 10 pairs of words presented to her. For eg. she could distinguish "gaddi" (hay) from "gadi" (patch); "gudi" (temple) from "gudu" (nest), (even though the final vowels are different) very easily.

Analysis of the responses in intonation identification task suggest that imperative statements can be distinguished from interrogative sentences by profoundly deaf children through vibration, but the angry and request types could not be distinguished from neutral statements. Since the data was very limited, conclusive statements cannot be made at this point. Erbar's (1978) subjects could learn to distinguish neutral vs.sad speech patterns from happy and angry sentences. However, they had great difficulty perceiving the distinction between happy and angry sentences. Drbar explained that the difference is only in the fundamental frequency contour, which is difficult to perceive through vibratory sense.

The results on the plosive recognition task were also encouraging. Since care was not taken to give equal representation to all the phonemes, it is difficult to make conclusive statements. However, the greater constriction to the air stream and sudden release during the producation of bilabial plosives does seem to have distinctive vibratory cues. In any case more data is needed to understand stimulus variables such as phoneme type. Inspired by the results of this experiment, the author wishes to suggest that the vibratory training for young profoundly deaf children with limited language should consists of the following steps.

1. Have the child to imitate the number of beats on a drum. The beats of the teacher need not be seperated by equal intervals of time.
2. Demonstrate slow and quick motions of the hand while beating the drum and have him repeat the same.
3. Demonstrate loud Vs. soft beats and have him repordue them on a drum.
4. Demonstrate long beats, short beats and contrast them. Have him give non-verbal responses such as writing "-" for long beat and "." for short beats. Have him repeat two short beats (..), two long beats (--), one short and one long beat (. -) and so on in slow and quick motion.
5. Introduce long and short vowels contrast back vowels with front vowels.

6. After sufficient practice with vowels plasive consonants should be introduced. Child should be taught to perceive the difference the magnitude of vibration that occurs for voiceless phonemes as compared to voiced phonemes, unaspirated phonemes as compared to aspirated phonemes. A few examples of stimulus words which can be used in the initial period vibratory training are:

Po (go), Pu (flower), Papa (doll) Pappu (dhall), Uppu (salt), Upu (swing), Muppu (peal), Wapu (Swelling), Apu (Stop), Babu (boy).

7. Child should then be thought to contrast words like "papa" from "pappu" or "Aku" and 'akka' in which the second syllable receives relatively more emphasis due to gemination.

After sufficient training using all the other phonemes except the high frequency fricatives and affricates, child can be taught to distinguish certain intonation patterns of sentences like "adi kavali" (I want that) or "adi kavala? (do you want that?).

Vibrotary training is meaningful only if the child has access to the vibrator, virtually the whole day, Therefore, wearable vibro-tactile aids should be developed. They should be attached to powerful hearing aids with low frequency emphasis which will enable the profoundly deaf perceive suprasegmental information in speech better than the individual hearing aids alone does.

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4.1.0 A COMPARATIVE STUDY OF THE ADJUSTMENT OF NORMAL, MENTALLY RETARDED AND HANDICAPPED CHILDREN

by

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A B S T R A C T

The level of adjustment of a sample of mentally retarded, and a sample of handicapped (deaf and dumb) was compared with that of a sample of normal Ss. The age of the Ss ranged between 12+ and 17 years. The level of adjustment of the Ss was measured with the help of a problem checklist developed by the author.

It was found that the mentally retarded were less well adjusted compared to the normal group in the areas of health and physical development, finance and living conditions, personal adjustment, social adjustment, future:vocational, educational, marriage and sex, parents and home, academic adjustment and also with regard to their overall adjustment.

The handicapped differed significantly from the normals with regard to their adjustment in the areas of health and physical development, finance and living conditions, social adjustment, marriage and sex and over all adjustment. In all these areas the handicapped were less well adjusted than the normals.

The mentally retarded were less intelligent than the handicapped, who were in turn less intelligent than the normal group.

Every individual in any democratic society has a right for appropriate education or training so that he can use his potentialities, however, weak or strong they may be, and become a useful citizen without being a

it is the hounden duty of any society to take care of all its children - gifted, normal as well as the handicapped.

The early history of the handicapped was pathetic and tragic to say the least. In primitive and ancient times the handicapped were often discarded or destroyed, while in the middle ages and even today they are often emploited as clowns, fools or buffoons. Systematic and scientific work on the problem of looking after the retarded may be said to have begun with the work of Itard (1774-1939) on the wild boy (Victor) who was found in the forest of Aveyron in France. Seguin (1812-1880) followed his master Itard, in the service of this retarded and indeed went one step ahead and established the first public residential school for them. The Education for all Handicapped Children Act of 1975 (Abeson and Zettel, 1977), and today there are many institutions in US and other advanced countries to take care of the educational needs of the handicapped. In India, however, the existing facilities for the education of the handicapped are 'extremely inadequate' (Report of the Education Commission, 1966). Let us hope that in the Inter-national Year of the Handicapped, India will be able to make strides in this badly neglected area.

Life is a process of satisfaction of needs. However, the satisfaction of these needs is very often hindered by some difficulties or problems. The organism lives or dies depending upon its capacity to solve its problems.

Thus the individual who can effectively solve his problems and adjust to the environment, or modify the environment to suit his needs may be considered a well adjusted personality. No wonder therefore, that many a researcher devoted their attention to the psychology of adjustment. Several studies have been reported for example on the relation between adjustment and achievement (Coombs and Davis, 1967; Alhuwalia, 1969; Chawla, 1970). Some studies on the level of adjustment of different stratifications of students on the basis of type of family (Srivastava, et al, 1975; Conklin, 1976; Kurian, 1976), number of siblings (Rajalakshmi Muralidharan, 1969), occupational and educational status of parents (Yarrow, 1961; Venkata Rami Reddy, 1976; 1977), economic status of the family (Venkata Rami Reddy, 1979), etc. have been reported.

Studies on mental retardates concentrated their attention on their ability to deal with tasks requiring verbal mediation (Milgram and Furth, 1963; Balla and Zigler, 1964), the effect of failure on their cognitive style of functioning (Stevenson and Fahel, 1961; Zigler and Williams, 1963). Goodlad (1954), Coffield and Blommers (1958), Chambers and Caterall (1965) found that promotion of the mentally retarded from class to class without detaining them contributed to their social adjustment as well as academic standard, measured at a later stage. Wallin and Kolstoe (1966) observed that retardates' value judgements tended

to be absolute. They were quite ego centric and developed bizarre cause and effect relationships. Johnson (1963), Jordan (1966), Mathis (1970) and Shankar (1976) pointed out that the retarded were rejected by peers, parents and even teachers at times, leading to frustration. According to Shankar (1976) many of the retardates relapse into anti-social behaviour.

As early as in the 4th century B.C. Aristotle observed the absence of speech among the deaf; Chuang Tsu of China emphasised that children learnt to talk by bearing others talk and not because they were specially taught. Demosthenes seems to have placed pebbles in the mouth of stutterers to correct their speech (Fay, 1912). However, much of the scientific work in the case of the deaf and dumb is also of recent origin. A good amount of empirical work was carried out in the controversial area of different methods of teaching the deaf (Vernon, 1963; Advisory Committee on the Education of the Deaf, 1965; Meadows, 1968), while some others like Goyer and Yankauer (1959), James and Cooper (1966), investigated on the ability of the teachers to identify the speech and hearing handicapped children.

Pintner, et al (1941), Vernon (1969) and Mathis (1970) found that the deaf and dumb were mentally retarded to some extent and that their average IQ was less than 100. They were 2 to 5 years retarded in educational achievement compared to the normal children (Fusfeid, 1955). However, Meyerson (1955) reported conflicting results regarding the difference between the IQ of the deaf and normal children.

It may be seen from the above brief review that not much is known about the level of adjustment of mentally retarded and the deaf and dumb children compared to the normal.

Problem

Hence, the problem chosen for the investigation was a comparative study of the level of adjustment of the normal, mentally retarded and handicapped (deaf and dumb) children.

Sample

Students of VIII, IX and X classes in secondary schools located in Chittoor district of Andhra Pradesh and those belonging to V and VII classes of a School for the deaf and dumb located in the same district, constituted the population for the study. At the out set the secondary schools in the district were divided into three categories as urban, semi-urban and rural depending upon the locality in which they were situated and a proportionate sample of 630 students distributed between the two sexes, the three classes (VIII, IX and X) and the three localities (urban, semiurban and rural) was selected by a multistage stratified random sampling procedure. The sample of students was administered Raven's progressive matrices test to assess their mental ability. Those falling below the 5th percentile on the distribution of the scores obtained on the RPM by the 630 students were treated as mentally retarded following Heck (1940), Mayo (1962), Report of the US Office of Education (1972) and Shankar (1976), who found that there

were approximately 3 to $4\frac{1}{2}$ per cent mentally retarded in the school population. This procedure of administering the RPM and taking those who fell below the 5th percentile was followed to identify the mentally retarded students because of the non-availability of a standardised verbal test in the regional language (Telugu) which could give the IQ of the children. Further, the RPM has a unique advantage in that, it is a power test without a time limit and so the students need not work under stress of a time limit. Hence the errors in the scores that may occur due to anxiety are eliminated. Further the test contains figures which are interesting and absorbing and so provide necessary motivation for the students to take the test. Apart from this, the RPM is particularly suited to this investigation because the same test can be used on the deaf and dumb also, so that their scores can be compared with these obtained by the normal as well as the mentally retarded students.

20 students fell below the 5th percentile, who were taken as mentally retarded. A random sample of 20 pupils was selected from the remaining 610 to represent the normal group. The age of the Ss ranged between 12 and 17 years.

In this region of Andhra Pradesh there is only one school for the handicapped that is for the deaf and dumb. There were 29 students in the V and VII classes in that school, out of whom 4 were below 12 years of age*. From the

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*There are no students in the VI class in the current year in that school.

remaining 25 students 20 were selected at random to serve as Ss for the study. The age of most of these students also ranged between 12 and 17. There were 2 students who were 18 years old.

Method

S.V. Problem Check List developed by the author was used to assess the level of adjustment of the sample of Ss. The above check list contains 256 items which measure adjustment in 10 areas, viz., Health and physical development (HPD), Finance and living conditions (FLC), Personal adjustment (PA), Social adjustment (SA), Future: voational, educational (FVE), Moral and religious adjustment (MRA), Marriage and sex (MS), Parents and home (PH), Academic adjustment (AA) and Study habits (SH). The predictive validity of the instrument was established by administering it to known groups. Its content validity was established by 30 judges comprising of secondary school teachers and postgraduate and research students of psychology and 50 secondary school pupils. The test-retest reliability of the checklist was 0.96 with a time interval of one week between the two administrations (N-147) varied between 0.85 and 0.95.

In this problem checklist as in the Mooney Problem Checklist (Mooney, 1950), the number of problems marked by an individual in any adjustment area constituted his adjustment score in that area. Hence, the higherr the score on the instrument the less the level of adjustment.

The checklist was made anonymous to ensure free and frank expression of their problems (Fisher, 1946) especially from female Ss in delicate areas like problems related to marriage, sex, etc.

Results and Discussion

Table shows the mean adjustment scores of the three categories of Ss. It may be seen that the mean scores of the retarded were higher than those of the normals in all areas indicating that the former were less adjusted than the latter. *t* test was applied to find the significance of the difference between the mean scores of the two groups.£ The results of the *t* test are shown in the 5th column of the table.

It may be seen that in the area of Health and Physical Development (HPD) the mean score of the normal Ss was 3.05 while that of the retarded was 5.70. The difference between the two means was significant at 0.05 level (*t* =2.42). This shows that the retarded were significantly less well adjusted than the normals with regard to their health and physical development. According to Culley, et al (1963), Mosier, et al (1965), Kirk (1970), the mentally retarded show a general developmental retardation. They have more physical defects than the normal. The results obtained in the study are in line with the above findings.

£ As the purpose of the investigation was to compare the level of adjustment of the retarded with that of the normal, and that of the handicapped with the normal, *t* test was applied instead of applying ANOVA taking all the three groups together.

Table

Means and SDs of normal, mentally retarded and handicapped groups on different areas of adjustment (Each group N=2)

Area		Normal	Retarded	Handi-capped	t£	t££
HPD	M	3.05	5.70	8.05	2.42*	6.00***
	SD	2.04	4.45	3.12		
FLC	M	3.35	6.75	6.20	2.55*	3.05**
	SD	2.43	5.45	3.40		
PA	M	4.60	7.30	4.90	2.68*	0.27@
	SD	2.60	3.68	4.26		
SA	M	3.00	6.40	5.50	3.36**	2.28*
	SD	2.53	3-76	4.20		
FVE	M	4.35	7.40	4.90	2.20*	0.48@
	SD	3.72	4.95	3.58		
MR	M	3.10	3.95	3.00	1.06@	0.11@
	SD	2.23	2.82	3.22		
MS	M	1.15	4.30	3.15	3.51**	3.02**
	SD	1.24	3.[illegible]2	2.69		
PH	M	3.85	4.90	4.85	0.92@	0.94
	SD	2.82	4.25	4.03		
AA	M	6.65	9.45	8.30	2.04*	1.23@
	SD	3.95	4.36	4.52		
SH	M	4.00	4.80	4.10	0.87@	0.12@
	SD	3.11	2.71	1.97		
Over-all	M	37.00	60.65	53.10	3.33**	2.24*
	SD	15.92	27.29	27.92		

Note: *** t significant at 0.001 level.
** t significant at 0.01 level.
* t significant at 0.05 level.
@ t not significant at 0.05 level.
£ t values for the difference between the means of normal and retarded groups.
££ t values for the difference between the means of normal and handicapped groups.
None of the t values for the difference between the means of retarded and handicapped groups was significant at 0.05 level.

The normal Ss were better adjusted than the mentally retarded in the area of Finance and living conditions (FLC) also. Many of the retarded belong to the poor families and live in substandard homes which are inferior in sanitation and attention to health matters (Dingman and Tarjan, 1960; Hunt, 1969; Kirk, 1970). This explains the significant difference between the retarded and the normal in this area of adjustment, viz., finance and living conditions.

According to Kirk (1970) the retarded have a low level of frustration tolerance. Though Heber (1964) observed that the available research data is not sufficient to draw a definite conclusion in the area, many contend that the retarded have feelings of inadequacy, lowered self-concept and increased anxiety (Hunt, 1969). It is no wonder that the retarded exhibited maladjustment in the area of personal adjustment compared to the normals.

The retarded are rejected by their peers, teachers and even their parents at times (Johnson, 1963; Jordon, 1966; Mathis, 1970; Shanker, 1976). The rate of social development of the retarded is one half to three fourths that of the normal (Kirk, 1970). Prevalence of delinquency is more among the mentally retarded than among the normals (Beier, 1964; Shanker, 1976). The results obtained in this study derive support from the above findings. The mean score of the retardates with regard to their social adjustment (SA) was 6.40, while their normal counterparts obtained a mean score of 3.00 showing that the retarded were not and socially adjusted as the normals.

When they could not make satisfactory social adjustments with the members of their own sex it is no wonder that they were not well adjusted with the opposite sex.

This is reflected in the low level of their adjustment in the area of Marriage and Sex (MS).

The mentally retarded were significantly less adjusted than the normal Ss in the area of academic adjustment (AA) also. The fact that the retarded are inferior in their mental ability does not permit them to follow the school curriculum which is mainly designed to suit the needs of the average child. It is but natural that the retarded have more problems in this area of adjustment. That the retarded are not able to achieve well in their academic pursuits has its inevitable effect on their adjustment in the area of Future: vocational, educational (FVE).

The mean overall adjustment score of the normal Ss was 37.00, while that of the retarded Ss was as high as 60.65. The difference between the two means was significant at 0.01 level (t=3.33). This shows that the mentally retarded were significantly less adjusted in general than their normal counterparts.

An examination of the mean scores of the normal and handicapped show that the latter obtained higher mean scores in almost all areas of adjustment indicating inadequate adjustment of the handicapped compared to the normal.

As the deaf and dumb are deprived of the most vital tools of interaction with others they tend to get rejected and feel dejected. They were found to exhibit personal and social mal-adjustment (Wallin, 1966; Shanker, 1976). They

were lagging behind the normal in their social maturity (Treacy, 1955). It may be seen from the t values presented in the last column that the normal and the deaf differed significantly with regard to their social adjustment. This result is in line with the above findings.

The deaf were emotionally maladjusted (Myklebust, 1964) and exhibited inferiority complexes, anxieties, fears and tensions (Goodstein, 1958). However, those enrolled in residential schools were far bettter off than their counterparts in iav public schools (Quigley and Frisina, 1961; Myklebust, 1964). In this investigation also the sample of deaf were drawn from a residential school. As such there was no sifnificant difference between the level of personal adjustment of the normal and the handicapped.

It is needless to point out that when the deaf and sumb could not make satisfactory social adjustments with their peers, they would have more problems in making friends with the opposite sex. Further, the fact that they were handicapped would be a big hurdle in their getting married. Hence the handicapped were significantly less adjusted than the normals in the area of Marriage and sex (MS).

Fiedler (1951) reported that a majority of the deaf students hailed from low SES groups. This was true of the sample of Ss in this investigation also. The normal and handicapped differed significantly with regard to their adjustment in the area of Finance and living conditions (FLC).

The low SES is very often accompanied by poor sanitary conditions of the home and lack of proper medical care. All these have their invariable effect on the health and physical development of the children who are already handicapped. This is reflected in the inadequate adjustment of the handicapped group compared to the normal Ss in the area of Health and physical development (HPD).

In the overall adjustment also there was a significant difference between the level of adjustment of the handicapped and the normal, showing that though the handicap is only in certain parts of the body, it is the whole person that is effected.

A comparison of the adjustment scores of the mentally retarded and the deaf and dumb showed that the latter were somewhat better adjusted than the former in all areas except Health and physical development (HPD). However, none of the differences between means was significant at 0.05 level.

With regard to the mental ability of the handicapped and the normal, the mean RPM score of the handicapped Ss was 23.70, while that of the normal group was 35.00. The difference between the two was significant at 0.001 level (t=3.84, df=38). The mean score of the retarded group was 15.30. This was significantly less than the mean score of the handicapped group (t =3.98, significant at 0.001 level for 38 df).

Conclusions

The mentally retarded were significantly less adjusted than the normal in the areas of Health and physical development, Finance and living conditions, Personal adjustment, Social adjustment, Future: vocational, educational, Marriage and sex, Academic adjustment and also with regard to the overall adjustment.

There was a significant difference between the normals and the deaf and dumb in the areas of Health and physical development, Finance and living conditions, Social adjustment, Marriage and sex and also with regard to the overall adjustment. In all the areas of the deaf and dumb were less well adjusted than the normal. There was no significant difference between the level of adjustment of the mentally retarded and the deaf and dumb.

The mental ability of the deaf and dumb as measured by the RPM was significantly less than that of the normal Ss. They were, however, better off in this regard than the mentally retarded.

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Nature of Speech and Language Problems in Mentally Retarded Children. Results of a Survey using modified ESN(S) Scale.

By

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A B S T R A C T

A disorder of speach and language may be described as a chronic limitation of an individual's ability to engage in social behaviour involving verbal and sometimes non verbal processes. Many studies have shown that severe speech and language disabilities of the mentally retarded led to under development in relation to other skills in other areas of development. The incidence of speech & language problems increases as IQ decreases. Many studies have typically described speech than language disabilities in the mentally retarded. The aim of this paper was to investigate the nature of difficulties in detail and to develop a suitable testing scale. 50 students admitted to BMVB special section for the Mentally Retarded in the age rangeof 4 to 16 yrs. with an IQ range of 40 to 80 between 1976 to 1980 were taken as subjects; children were tested in the classroom situation thrice a week for half an hour. A scale was developed with the help of ESN(S) scale earlier developed in English for testing. This scale consisted of two parts Reception & Expression with items arranged in hierarchy. Results revealed that 90% of the children have different language difficulties. There was a significant relationship between chronological age and language ability. As the child became older number of correct scoring also increased on both the scales. Mentally retarded children seemed to go through the same stages of development as normal children in respect of single word utterances.

However language development stopped far short of that reached by normal children; the rate of progress slowed down, so that they seemed to to lag further behind the older they grew. There was a significant relationship between I.Q. and items passed. The ability to use language was obviously bound up with the development of intelligence, but the relationship is far from simple. The questionnaire perhaps would be a valuable, objective tool for continuous speech and language assessment. Each child's communicative ability throughout his schooling can be recorded and compared. The result can be used to group children for language work, and prime areas in which this could be concentrated. Teachers can prepare their teaching material in a hierarchy incorporating all the features stressed in the study such as gradually increasing sentence length, meaning, number of commands etc.

A disorder of speech and language may be described as a chronic limitation of an individual's ability to engage in social behaviour involving verbal and sometimes non verbal processes. Many studies have revealed that severe speech and language disabilities of the mentally subnormal led to under-functioning in relation to other skills, in other areas of development.

Many studies have shown that the incidence of speech and language problems increases as IQ decreases.

A survey of the literature suggests that majority of the studies have been concerned with speech than with language disabilities of mentally subnormal and have typically described the incidence of disorders of voice or speech sound production associated with organic and inorganic causes.

The aim of this paper is to investigate the nature of difficulties in detail and to see whether speech and language acquisition in the mentally retarded follows a different pattern from that of normal children. Psycholinguists and linguists have shown the system of rules which a speaker appears to be using while using language. The task of the speech pathologist is to try to assess the extent to which these rules operate in a mentally retarded child's understanding and use of language. It is important to find out, at what level the child's use of language rules is faulty and why. The rule system taken for study concerns phonology, morphology and syntax. Investigation was carried out without assuming any theoretical position like developmental vs deficit, performance vs competence, IQ etc. A clear distinction between speech and language was kept in mind. Speech is defined as the use of vocalizations or articulation to express words or vocal symbols. Language is a system of symbols wherein the symbols are systematically related to one another and are capable of generating novel utterances.

According to Caroll (1967)[2] "When we talk, therefore about the language of mental retardates, we are taking about system that they have learnt. When we refer to the speech, we are referring to the actual behaviour of these individuals using language".

Subjects: 50 children admitted to B.M.V.B. special section for the mentally retarded during 1976-1980. Data is given in Table No.1.

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2. Carroll, 1967, Psycholinguistics in the study of mental retardation. In Schie Jelbusch, R.L. (O Peland (eds) Language & Mental Retardation, New York, Holt.

Table - I

Age Range	No.	Sex M.	F	IQ Range	Clinical Group
5 - 8 yrs	18	12	6	40 to 80	Down Syndrom - 5
8 -11 "	12	7	5	"	Cerebral Palsy - 3
11 -14 "	11	6	5	"	Cleft Palate repaired-1
14 & above	9	5	4	"	

For testing, the class room situation was preferred since the child is accustomed to the same and he is at ease. Information thus gained could have direct and relevant implication for the design and modification of individual speech and language programmes.

Methodology: Through observation samples of language were collected during teaching and free play situations. Data were then collected and analysed. Flash cards, action pictures, picture stories were used to elicit, simple one to two word utterances, the use of present, past and future tenses, singular and plural forms, simple and complex sentences. A sample of continuous speech was elicited by telling the group an interesting story illustrated by a suitable picture and then asking the subject to tell the story to the group. Each child was assessed individually in a group without making the child conscious of being tested. Observation period was twice a week for half an hour. Teachers were briefed about the objectives of the programme and their co-operation was sought. A scale reported by Brenda Kellett and associates (1977)[3] was used with slight modifications.

3. Brenda Kellett-(1977)-An initial Survey of the language OF ESN(S) children in Moinchester- the results of a teachers workshop. In Language & Communication in the mentally handicapped, Edt. by Paul Berry, London: Edward Arnold (Publishers) Ltd.

This modification was done with the help of a Psycholinguist whose mother tongue is Hindi. In their survey of ESN(s) children they have divided language skills into two main areas namely reception and expression with subsection for articulation and gesture. This sub-test 'gesture' is not included here as none of the subjects came under this category.

The scale is as follows:

Name of the child Age. Sex.

Clinical Diagnoses

Any other disability like hearing loss, visual defect, physical defect, speech defect etc. etc.

Production - (X) - Direct imitation of digits in series and at random.

a) Direct imitation of single words.
b) Direct imitation of phrases (two to three words)
c) Spontaneous meaningful words.
d) Spontaneous two word utterances.
e) Spontaneous 2-3 word utterances.
f) Complete sentence (even ungrammatical)
g) Grammatically correct sentence.

Reception

a)
b)
c)
d)
e)
f)
g)
h)
i)

Articulation - a) Defective, intelligible, unintelligible.

Results and Discussion: The results tallied with that of ESN(s) survey. The questionnaire differentiated between language ability levels in developmental sequence.

Production - All children were credited with items preceding their present level of functioning. Results suggested that these items were mainly in developmental order as in Graph No.I. This shows that language is perhaps hierarchically organized within as well as between skills. Some skills are essential prerequisites for the development and use of others. Items (a) to (d) looked at the progression from imitation to spontaneous use of single words. 100% could imitate single words (item a) and 75% of used it meaningfully (item c). Items (e) to (g) followed the use of expanded utterances for adequate, if ungrammatical speech. This is 55% to 10%. Only 10% could use grammatically correct sentences (item g). But still their speech was devoid of creativity and novelty. Perhaps this scale should include one more item beyond (g) depicting these features of language. There seems to be a significant relationship between chronological age and items passed as shown in Table 2. As the child becomes older number of higher items passed also increased. Maturity perhaps plays an important role in language acquisition and its stabilization.

Table - 2

N	C A	a	b	c	d	e	f
18	5 - 8 yrs	2	3	4	5	2	2
12	8 -11 "	2	1	1	3	2	3
11	11 -14 "	Nil	Nil	2	3	3	3
9	14 +	Nil	Nil	Nil	1	4	4

This observation has been cited by many authors. Lenneberg.[4] et. al (1964) [4] Blanchard(1964)[5] Webb & Kinde,[6] (1968). Mentally retarded children seemed to go through the same stages of development as normal children in respect of single word utterances. However language development stopped for short of that reached by normal children, the rate of progress slowed down as the children became older, so that they seemed to lag further behind the older they became.

There was a significant relationship between I.Q. and items passed. As the I.Q. increased number of children passing items (e) & (f) also increased as shown in Table 3. The ability to use language is obviously bound up with the development of intelligence, but the relationship between them is far from simple.

Table - 3

Items Number	I.Q. range	a	b	c	d	e	f
13	50 - 60	2	3	1	4	1	2
18	60 - 70	2	2	4	3	2	3
12	70 - 80	1	Nil	Nil	Nil	5	6
7	80 +	Nil	-	-	-	4	3

In view of the results i.e. delay or deficit in language abilities, questions our dependance on 'exposure' to a rich and linguistically stimulating experience. This may be an act of faith than judgement unless specific efforts are directed to obtain the desired verbal interaction.

4. Lenneberg, E.H., Nicholos IE and Rosenberger E.F. (1964) Primitive stages of Language development in Mongolism In Disorders of communication, XLII, New York, Assoc Res. Neol, Ment. Dis.

5,6. Mittler P.S, Language & communication.

In a recent study by Gillion Fenn (1977)[7], it is evident that a controlled and structured approach to language teaching would be more helpful to the M.R. children than an enriched environment. In some cases children may be more confused and unable to cope because they are receiving too much stimulation. They are unable to extract from such an environment sufficient information to build their own language structure.

Reception - This was assessed as the ability to respond appropriately to instructions graded in complexity and length. A native Hindi speaker who was a linguist helped during translation. Items were selected in such a way that there was little chance for the child to guess. The child had to perform fairly unexpected actions with the test material. Care was taken not to violate pragmatic expectations for example, put the spoon under the cup, if the interation is to test the seperation. During testing, as far as possible, non-linguistic cues were excluded.

The over-all trend of correct responses was downward, 90% responded to simple instruction compared to 40% to a complex sentence.

An interesting result was seen when instruction length was kept constant but meaning was varied. 100% responded to item (b) but 90% to item (c). A significant relationship was seen between I Q and items scored . This was similiar to that of production part. The table reveals the relationship between CA and items scored.

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7. Gillion & Fenn (1977), Against verbal enrichment p.84. In Language & Communication in the mentally handicapped, Paul Berry (1967) EDt. London, Arnold(Publishers) Ltd.

Table - 4

Age Group	No.	Items								
		a	b	c	d	e	f	g	h	i
5 - 8	18	-	-	-	-	9	7	2	-	-
8 - 11	12	-	-	-	3	2	3	1	2	1
11 - 14	11	-	-	-	1	1	4	2	2	1
14 +		-	-	-	-	-	-	1	2	6

Processes underlying reception of language are difficult to isolate. The child needs to be able to attend, listen, discriminate between sounds and later to adapt to the sequential aspects of incoming language. Our therapy should try to help a child improve basic skills such as attention, discrimination between sounds, words and sentences gradually increasing in length and complexity. It was interesting to note that all the Down's Syndrome Children compared to other clinical categories scored high on expressive items compared to receptive items.

Articulation - 22% of the children had misarticulation. 14% unintelligible and 8% intelligible inspite of defective articulation. Mostly the misarticulation children came under items (a),(b),(c),(d) (production). It appears therefore that the articulation of the majority of this population does improve with age and general expressive competence. All the 11 children exhibited short auditory memory span for digits at random (3 & below) compared to other children without misarticulation.

Conclusion - Generally, a child who functioned low on one scale did so on another. However, direct comparison between items on the reception and production scales is not

possible as levels are not equivalent. In the absence of gross sensory/physical disability, the older the child, the higher is his expressive and comprehended language. Even within the specified age range, groups were not homogenious However, these results do indicate possible grouping of childre for language work and prime areas in which this could be concentrated. The questionnaire made teachers more aware of the language functioning in their group. Some of them even felt that the questionnaire over or under-estimated, some aspects of language, particularly on the higher items of the production side. This may be due to the fact that no distinction was made for the quantity and variety of utterances.

The results of the study are to a certain extent dependent upon subjective interpretations of items by teachers even though each item was explained clearly. This questionnaire perhaps would be a valuable tool for continuous speech and language assessment and each child's progressive, communicative ability through school can be recorded and compared. While teaching speech and language to these children, teachers can prepare their teaching material in a hierarchy, incorporating all the features such as gradually increasing sentence length, commands meanings, etc.

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4.3.0 COGNITIVE DEVELOPMENT OF EDUCABLY MENTALLY RETARDED*

by

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ABSTRACT

The main intent was to assess the cognitive development of EMR and compare them with the normal children.

Fifty children identified as educably mentally retarded after administering coloured progressive matrices were selected for this study. Cognitive development of the children was assessed by 'Cognitive Development Status Test'. Information regarding their age, parents' occupation, education, income were collected from the files maintained in the schools. After analysing the data the investigator found that the items which were not performed by children of 7 to 8.6 years old were performed by children of 8.6+ years old. Educably mentally retarded children are capable of performing certain items of Cognitive Development Status Test at later ages than normal children. They lag behind very much in performing conservation items. The educably mentally retarded children also have three different stages of conservation

*Based on my unpublished M.Ed. Dissertation entitled "Cognitive Development of Educably Mentally Retarded", University of Mysore, 1980 guided by Dr. A.S. Raghavakumari, Lecturer, Department of Education, University of Mysore.

such as non-conservation, transition and conservation. EMR children of age 8.6+ years are equal to normal children of 6-7 years in cognitive development. The difference between mean performance of girls and boys is negligible. There is a high, direct relation between intelligence and cognitive development. Cognitive development is independent of SES. Further cognitive development is less affected by SES.

At present the educators are more concerned about the cognitive development of the individual although alround development of an individual is the overall purpose of education. The development of cognition does not mean only acquiring knowledge about the world, planet, solar system but its significance in normal day-to-day activities like judging the amount of food, quantity of water in different containers and the like . It is a great puzzle and at the same time interesting to know the reason why the child prefers the smaller container instead of the big one. Jean Piaget has attempted to answer such questions. He has succeeded in giving explanations to such a type of cognitive behaviour of children by evolving and elaborating a set of constructs which have in many instances provided amazing insights into the development of the functions and structures of the human mind, though Piaget believes in the capacity to learn, he maintains that intelligence is only reflected in the pool of knowledge which has been acquired by an

individual. Piaget exhibits his uniqueness in preoccupying almost exclusively with the functions and the structures which underlie an intelligent activity.

Being educators, we can develop a better insight into the capabilities of children by studying the cognitive development rather than content of intelligence. Because the phrase "cognitive development" refers to the growth and change in such phenomena as thinking, perceiving, imagining, problem-solving and concept formation. The concept includes five major response classes which are very much essential in undergoing the process of education : (i) perceptual differentiation of environmental stimuli, (ii) development of a vocabulary that allows the child to label external events and internal feelings, (iii) acquisition of rules about natural events and the ability to apply rules of reasoning to problem situations, (iv) increased capacity for immediate memory resulting, in part, from more efficient use of abstract words to group or "chunks" of information, and (v) increased ability to communicate thoughts verbally or graphically. In his developmental theory of cognitive development, Piaget has attempted to find out what are the different types of tasks the children are capable of performing, and what are the different types of mental operations available in children at different age levels. This theory has many educational implications and guides educators in curriculum development, instructional methodology,instructional materials etc.

Though Piaget developed his theory based on normal children it has its own implications for the field of mental retardation. There are two relevant concepts in Piaget's theory :

(1) Developmental orientation - Piaget has given us a picture of a central nervous system, which as a result of its intercourse with the environment during the formative years, constantly forms levels of integration which are both quantitatively and qualitatively different from the syntheses out of which they have evolved.

This orientation shifts our attention towards what they lack. This results in gaining a much richer and fuller picture about profundly retarded adults and even more significantly, the mildly retarded twelve-year-old whose thought processes are just emerging from the pre-operational sub-period which can be appreciated in terms of the capabilities he has. He can be seen as a child in transit from one whole way of thinking to another.

(2) Stages of development : Piaget sees intellectual development as an unfolding process, marked by the progressive disappearance of earlier symptoms of thought in favour of new higher order systems. He, thus, tends to think of mental retradation as the result of the child's failure to progress beyond inferior levels or stages of integration. The greater the degree of retardation, the lower the level or stage of organisation at which the individual is fixated.

Inhelder has proposed a scheme which classifies mentally retarded adults on the basis of cognitive stage they have attained. In her classificatory system, the severely and profoundly mentally retarded adult ("idiot") is viewed as fixated at the level of sensorimotor intelligence; the moderately retarded adult ("Imbecile") is seen as incapable of surpassing the pre-operational intutive sub-period, the mildly retarded adult ("moron",or Educably Mentally Retarded) is characterized as unable to progress beyond the level of concrete operations,and, finally the borderline adult is seen as able of using only the simpler forms of formal operations.

Educably mentally retarded considered as having (1) minimum educability in the academic subjects of the school,(2) social adjustment to such a point that he can get along independently in the community, and (3) minimum occupational adequacy to such a degree that he can support himself partially or totally, at the adult stage. Because of the only fact that EMR have minimum potentiality for academic achievement we should not neglect them.

The field of special education is now expanding day by day. Till the 19th century no attempt was made to educate the mentally retarded. For the first time Itard maintained a record of attempts at educating the mentally retarded child. He found that even severely retarded children could be improved with continual effort, then there is every possibility

to improve the academic achievement of educably mentally retarded in which alone they are quite disintinguished from others.

Transfer of learning from one situation to another situation is the main feature of education; an educated man is capable of discriminating or generalising the different stimuli and respond correspondingly, only such children who have crossed pre-operational stage and reached concrete-operational stage have the ability to generalize responses. If the child fixates at the pre-operational level itself, he is unable to reason, proceed from the particular to the abstract in an irreversible sequence; he cannot perceive the similarities and come to a generalization. Then there is no use in providing formal education to such a child because that fails to make him an educated individual so it is necessary to find out whether the so called educably mentally retarded will be able to deal with those tasks which are indicative of attainment of concrete operational stages atleast at little older ages compared to normal age, so that the teacher/educator can be able to fix the lower age limit for entrance of such children into the schools so that academic progress can be observed in such children. If we accept Inhelder's classificatory system EMR will be fixated at the concrete operational stage that means he will never attain formal operational stage, which hinders him in dealing with abstract concepts. As far as the mentally retarded are concerned,

the validity of the classificatory system is not justified through research.

Marywoodward studied 147 subjects, 7 to 16 years of age, who were either profoundly or severely retarded. Each child was presented with a variety of problems relevant to each of the six stages of sensorimotor intelligence and observed that the sequence of developmental indices of sensorimotor intelligence which Piaget has described for normal children is applicable to mental retarded children.

Piaget maintains that cognitive development takes place as a result of interaction of an individual with the environment. The organism is constantly being reciprocally moulded by and is being moulded by the environment. This suggests that through the enriched congenial environment it is possible to make one capable of utilizing his potentiality to the best possible extent. If an individual exhibits relatively lower cognitive development than his level of intelligence, it implies that such an individual is deprived of a congenial environment for interaction. This can be varified by finding the correlation between intelligence which is generally considered as innate and cognitive development.

OBJECTIVES

1. To find out what cognitive tasks the EMR are capable of performing at particular age levels.
2. To compare the cognitive development of EMR children (both boys and girls) of different age groups.

3. To compare EMR with normal in terms of performance on some tasks demanding cognitive development.

4. To compare the thought processes of EMR with that of normal at the conservation stage.

5. To find out the relation of cognitive development with SIQ and SES among EMR students.

METHODOLOGY

Subjects

On the basis of teachers' opinion all children with poor academic achievement who feel within the age range of 7 to 96+ were selected from 6 primary schools meant for normal children in Mysore city and Chamarajanagar (a suburb). These children appeared normal with respect to physical development, language development and school adjustment. Among such children, 50 were identified as educably mentally retardd after administering Raven's Coloured Progressive Materices. The fifty children thus identified constituted the sample for this investigation. The sample included 23 boys and 27 girls. Table 1 below gives an idea about the distribution of the sample.

TABLE 1

Distribution of the Sample according to Age, Sex and Scores on CPM (N = 50)

Age group	Boys	Girls	V grade (according to CPM)	Below III & above V grade (according to CPM)
(a) 7 - 8	2	4	5	1
(b) 8.1 - 8.6	9	8	14	3
(c) 8.7 - 9.0	4	5	5	4
(d) 9.1 - 9.6	5	4	8	1
(e) 9.6+	3	6	6	3
	23	27	38	12

For the sake of convenience and to avoid limitations resulting from small sized samples in the different age groups,(a) abd (b), that is, from 7.0 to 8.6 years were considered as Group I and (c), (d), and (e) that is , from 8.7 to 9.6+ were regarded as Group II for the purpose of analysis of the data.

To such a sample Cognitive Development Status Test (CDST) developed by Padmini and Nayar, Department of Education, University of Mysore, 1980 (unpublished) was administered individually to assess the cognitive development. Proper rapport between the investigator and subjects before assessment before assessment was established, the children were encouraged to perform tasks through positive reinforcement (negative reinforcement was avoided throughout the period of testing). Test was administered in two sittings to avoid the interference of fatigue in performance and to maintain interest of the subject.

The information about child's date of birth, parents' education, occupation,income was collected by

referring to the files maintained in the schools. Child's SES was found out by employing revised edition of Kuppuswamy's Socio-economic Status Scale (1977).

HYPOTHESES

To meet objectives 2,3,4 and 5 the following hypotheses were formulated :

(1) There is significant difference between the means of the Group I and the Group II children with respect to

(a) the following sub-tests:

(i) Metric Relation (MR)

(ii) Spatial Relation (S.R.)

(iii) Conservation (C)

(iv) Temporal Relation (T.R.)

(v) Signs-Symbols (S.S.)

(v) Belongingness (B(and

(b) means of total CDST scores.

(2) There is no difference between the means of the boys and girls of Group I and boys and girls of Group II with respect to -

(a) following sub-tests:

(i) Metric Relation (M.R.)

(ii) Spatial Relation (S.R.)

(iii) Conservation (C)

(iv) Temporal Relation (T.R.)

(v) Signs-Symbols (S.S.) and

(vi) Belongingness (B) and

(b) total CDST scores.

(3) There is significant difference between means of the CDST scores of whole sample of EMR and normal children.

(4) EMR also have three different stages of conservation such as non-conservation, transition and conservation like normal children.

(5) There is significant relationship between IQ (measured) and level of cognitive development.

(6) Cognitive development is independent of SES of parents.

RESULTS AND DISCUSSION

(a) Cognitive Development of EMR at Different Age Levels

In order to find out the significance of difference between means of Groups I and II in each sub-test and total CDST 't' of significance was applied.

Table 2 : Means of I and II Groups in each sub-test and total CDST and 't' Ratio between them

Group	MR	SR	C	TR	SS	B	Total CDST
Mean of Group I (N=23)	15.00	17.00	2.80	4.80	9.07	12.46	59.40
Mean of Group II (N=27)	14.00	14.42	4.54	4.76	7.70	14.56	63.57
't' ratio (df=48)	0.05	2.06*	2.14*	0.36	2.05*	1.54	1.12

*Significant at 0.05 level

From this table it is clear that there is significant difference only in 3 cases. The results obtained imply that most of the cognitive abilities will be developed by the age of 7-8.6 years in EMR children.

Judgement of invariance of quantity of matters conservation will be developed at later years, that is, after 8.6 years of age. Though there is significant difference between mean performance of both groups in sub-tests, spatial relations (SR) and Signs-Symbols (SS), it is not possible to give appropriate reason because means of Group I are greater man those of Group II in those cases. This may be attributed to the fact that individual differences in performing a particular task, especially entrance scores will affect the means.

Itemwise comparisons of Groups I and II were also attempted by Item analysis, of course in a crude way, by comparing the percentage of cases who have obtained full credit (maximum marks allotted to that item) and percentages of cases who have obtained partial credit (less than maximum and greater than '0') belonging to Groups I and II.

Table-3 : The number and percentage of Group I (N=23) and Group II (N=27) cases obtained full credit and partial credit in the items of various sub-tests

Items	No. of Cases which had obtained full credit		Percentage		No. of cases which had obtained partial credit		Percentage	
	Group I	Group II	Group I	Group II	Group I	Group II	Group I	Group II
Subtest-I - Metric Relations (MR) :								
1. Length seriation	9	17	39.15	62.90	13	6	56.55	22.20
2. Area seriation	18	20	82.65	74	3	3	13.35	11.10
3. Volume seriation	0	3	0	11.10	16	10	69.60	37.00
4. Equidistant point location	2	3	8.70	11.10	18	15	78.30	56.50
5. Distance estimation	5	4	21.75	14.80	17	21	73.95	77.70

1	2	3	4	5	6	7	8	9	10
Subtest II-Spatial Relations (SR) :									
6.	Haptic recognition	0	1	0.00	3.70	23	25	100.00	92.50
7.	Figure drawing	0	0	0.00	0.00	20	24	87.00	88.80
8.	Shape recognition	19	16	82.65	59.20	4	11	17.40	40.70
9.	Shape completion	13	11	56.55	40.70	8	13	34.80	48.10
10.	Martial construction	9	13	39.15	48.10	14	14	60.90	51.80
Sub-test III - Conservation (C) :									
11.	Number	6	19	28.10	70.30	2	0	8.70	0.00
12.	Area	1	7	4.35	25.90	15	1	55.55	3.70
13.	Length	3	11	13.05	40.70	2	4	8.70	14.80
14.	Mass	1	7	4.35	25.90	0	0	0.00	0.00
15.	Liquid	2	7	8.70	25.90	2	4	8:70	14.80
Sub-test- IV : Temporal Relations (TR) :									
16.	Doll Racing	2	2	8.70	7.40	21	25	91.30	92.60
Sub-test V - Signs Symbols (SS) :									
Decoding symbols		2	7	8.70	25.90	20	20	87	74
Decoding signs into action		16	25	69.60	92.50	6	3	26.10	11.10
Sub-test VI - Belongingness (B) :									
Classification of pictures		0	5	0.00	18.50	15	15	65.25	48.10
Classification of shapes		5	4	21.75	14.80	18	23	78.30	85.10
Identification of odd thing		4	8	17.40	29.60	11	13	47.85	48.10

It is found that considerable percentage of children in both the groups had obtained partial credit. This may be due to the fact that each item of CDST in its turn is having more than one situation. Such children were capable of performing only one or two significations of an item. In majority of cases percentage of children who had obtained full credit belonging to Group II is more in comparison with those in Group I. This suggests that there is noticeable difference between Groups I and II in performing those tasks. This suggests that children are capable of performing such tasks only after 8.6 years of age.

From the results obtained and the discussion made so far hypothesis can be modified as-there is significant difference between the means of Group I and the Group II only is specific sub-tests and total CDST scores.

As shown in table-3 lesser percentage of children in both the groups were able to give conservation responses. The percentage of children who obtained partial credit, which indicates that they were in transition stage was also less. Nearly 75% of children failed to give conservation responses to any situation indicating they were still in the non-conservation stage. This indicates that EMR children obtain the conservation stage at a later age as compared to the attainment of ability to deal with other tasks (included in other sub-tests). Hypothesis 2 stating "the educably mentally retarded children also have three different stages of conservation such as, non-conservation,

The table value for df=21 at 0.05 level of significance is 2.08 and at 0.01 level of significance is 2.83. Since the obtained value for the sub-tests metric relations, conservation and temporal relation is greater than at 0.01 level, the difference between means of boys and girls in these tests is significant at 0.05 level.

Table 5 - Differences in Group II Among Boys and Girls on Different Sub-tests and Total CDST

Sex	No. of children	M-R	S-R	C	T.R	S-S	B	Total CDST
Mean of boys	12	17.00	18.13	3.14	4.13	9.86	14.22	62.00
Mean of girls	15	14.40	12.57	4.03	4.83	8.96	13.80	61.00
't' ratio (df=25)		0.59	1.92	1.37	0.37	1.93	1.02	0.96

Apparently, though there is difference in mean performances between boys and girls of group II it is not significant at any level since the obtained value of 't' is less than that of table value (2.06) for 0.05 level of significance.

From the results obtained by comparing means of boys and girls of groups I and II separately, it can be concluded that at the age of 7 to 8.6 years there appears to be a difference between mean performance of boys and girls in certain tests and at the age of 8.6 years the ability

transition and conservation" is retained. Along with this, the results obtained also indicate one important fact that, is the child is in conservation stage in one aspect (number, mass etc) may be in transition or in non-conservation stage in other aspect. Attainment of each aspect of conservation is independent of attainment of the remaining aspects of conservation. Moreover, there is rigid sequence in the attainment of conservation stage in different aspects. In this way they resemble normal children.

b) Sex Difference in Cognitive Development of EMR

In order to find out the significance of difference between means of girls and boys in different subtests, an attempt was made to find out the mean of boys and girls within Group I and Group II separately, in different sub-tests and 't' test was applied.

Table 4 : Differences in Group I among Boys and Girls on Different Sub-tests and Total CDST

Sex	No. of children	M-R	S-R	C	T.R.	S-R	B	Total CDST
Mean of boys	11	17.00	18.13	3.14	4.13	9.86	14.22	62.00
Mean of girls	12	11.67	16.67	2.50	5.00	9.17	11.33	56.83
't' ratio (df-21)		2.38*	1.51	2.173*	2.12*	0.52	1.74	1.00

*Significant at 0.05 level.

of girls in performing those tasks appears to be more or less equal to that of the boys.

In the light of the results obtained above and the interpretation made, hypothesis no. 3 can be restated as follows : There is no significant difference between the means of boys and girls of group I except as regards metric relations, conservation and temporal relations.

The second part of the hypothesis that there is no significant difference between the means of Group II boys and girls in respect of (i) different sub-tests and (ii) total CDST, can be retained.

c) Comparison of EMR with Normal Children with respect to Cognitive Development :

The data related to the performance of normal children on CDST was obtained from the work of Padmini (1980). An attempt was made to compare the performances of EMR included in the present study with that of normal children. To compare the mean performances on total of CDST of normal children and educably mentally retard, critical ratio cannot be worked out because normal children are very much younger than mentally retarded children of the present sample. The mean of normal children is 39.97 whereas that of the present sample is 61.0 without applying any technique, large difference can be noticed between the mean performance of these two samples.

Table 6: Comparison of 14 Cognitive Development of Educable Mentally Retarded and Normal Children

Group	Means are	M-R	S-R	C	T-R	S-S	B	Total cost
I_N(N=150)	Means	10.64	9.14	2.69	1.54	8.53	10.58	37.80
(age-range 5-6 years)	%age of means	42.56	36.56	26.90	25.67	71.08	48.09	37.80
II_N(N=150)	Means	15.90	16.40	7.50	3.20	10.01	14.34	57.73
(age range 6-7 years)	%age of means	63.60	65.60	75.00	53.33	83.42	65.18	57.73
I(N=23)	Means	15.00	17.02	2.80	4.80	9.07	12.46	59.04
(age range 7-8.6 years)	%age of means	60.00	68.08	28.00	80.00	75.80	56.64	59.40
II(N=27)	Means	14.00	14.42	4.54	4.76	7.70	14.56	63.57
(age range 8.6-9.6+ years)	%age of means	56.00	57.68	45.40	79.33	64.17	66.18	63.57
Whole sample of	Means	15.10	15.67	3.30	4.74	9.30	13.86	61.00
EMR(N-50) (age range 7-9.6+ years)	%age of means	60.40	62.68	33.00	79.00	77.50	63.00	61.00

From the table it is clear that in all the sub-tests the performance of the present sample (7-9.6+ years) was good better than that of Group I normal children (5-6 years).

In the sub-tests of metric relations, spatial relations, signs-symbols and belongingness, though the performance of group II (6-7 years) was better than that of present sample (7-9.6+ years), the difference is negligible. That means the mean performance of the present sample is almost equal to that of group II normal children.

In temporal relations the sample included in the present study showed significant difference.

In conservation, the mean performance of the sample of the present study was very much less than group II of normal children and slightly greater than that of group I of normal children. This implies that in the conservation items, the sample of the present study was very much lagging behind as compared to normal children of even 6-7 years old. The mean performance of educably mentally retarded in total CDST is almost equal to that of group II of normal children.

By comparing the percentage of mean performance of both groups of normal children and of the present sample one can notice that in all the subtests groups I and II children of the present sample had performed better than that of Group I normal children. The Group II of the present sample was more or less equal to that of II group of normal children in the performance of subtests.

In conservation items, the mean performance of I group of the present sample (7-8.6 years) was equal only to that of Group I (5-6) of the normal children. But even children of 8.6+ of the present sample (II group) was very much lagging behind than that of group children II (6-7 years) of normal children).

The hypothesis 4 was stated as "There is significant difference between means of the CDST scores of whole sample of EMR and normal children".

This hypothesis could not be verified with the help of 't' test of significance of difference between

means because the groups are not matched groups as far as age factor is considered. But from the present investigation it can be inferred that if both the samples, normal and handicapped, were of same age group there would be significant difference between means of the CDST scores of whole sample of EMR and normal children. It can also be inferred that handicapped children of age 8.6+ years are equal to normal children of age 6-7 years. Therefore, on the basis of these inferrences the hypothesis is retained.

d) Relationship between IQ and Cognitive Development

The Pearson's product moment correlation coefficient between CDST scores and CPM scores was found to be 0.38 (significant at 9.01 level) indicating that there is a high positive correlation between CDST scores and CPM scores. Thus it can be inferred that CPM scores are indicative of an individual's measured IQ and of cognitive development status. In other words, from the obtained coefficient of correlation it is understood that there is a high, direct relation between intelligence and cognitive development.

It is revealed from the present study that children belonging to grade V (CPM) were also capable of performing certain tasks which are indicative of attainment of concrete operational stage but at a later age, as compared to normal children. According to Inholder's scheme of

classification of retarded individuals, the cognitive development of EMR will be arrested in concrete operational stage and it fails to progress beyond that stage. This investigation is restricted to the assessment of cognitive development of the EMR, and whether EMR will progress beyond concrete operational stage in later years is beyond the scope of this study. On the basis of the discussions made on the obtained results, hypothesis 5 that "there is significant relation between IQ (measured), and level of cognitive development" is retained.

To verify hypothesis 6 that "cognitive development is independent of socio-economic status of parents", interdependence of SES and CDST scores were found out by drawing contingency table and applying Chi-square test. X^2 was found to be equal to 4.18, which was not significant at 0.01 level or at 0.05 level, hence the hypothesis is retained. It indicates that cognitive development is more of innate ability and is little affected by socio-economic status of the parents.

Anyway, inferences drawn by the investigator might further be justified or rejected based on evidence of further research in the field. As the sample is a selective one, the investigator restricts her conclusions to the sample of the present study only.

Conclusions : From this investigation the following conclusions can be drawn :

(1) EMR children of age 8.6+ years are equal to normal children of 6-7 years in cognitive development.

(2) The items which are not performed by children of 7 to 8.6 years old will be performed by children of 8.6+ years old. Educably mentally retarded children are capable of performing certain items of CDST at later ages as compared to normal children.

(3) The EMR are able to perform tasks which are indicative of attainment of concrete operational stage at later ages compared to normal children.

(4) The EMR also have three different stages of conservation such as non-conservation, transition andservation. Attainment of each aspect of conservation is independent of attainment of the remaining aspects of conservation. There is no any rigid sequence in the attainment of conservation stage in different aspects.

(5) Individual differences can be noticed among EMR in difference between boys and girls in their mean performance is not significant.

(6) There is a high, direct relation between intelligence and cognitive development.

(7) Cognitive development is more of innate ability and is less affected by SES of parents.

(8) The cognitive development status test developed for normal children can be effectively utilized in assessing the cognitive development of EMR children also. Because of the older age of the

sample compared to normal children the test was easier to the sample except in case of conservation items.

Suggestions for further study :

(1) Study can be conducted to find out whether EMR will be able to perform all the tasks which confirm their attainment of concrete operational stage and also their further progress into formal operational stage.

(2) Study can be conducted to find out the exact relation between cognitive development and academic achievement.

(3) Efforts can be made in the direction of providing programmes to EMR which will facilitate their cognitive development.

(4) Efforts should be made to find out the suitable curricular activities which pay much attention to the positive aspects of EMR and making best use of those abilities.

(5) Studies should be conducted to analyse the impact of all the variables which have bearing on the slower rate of cognitive development among EMR.

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4.4.0 EXPOSURE TO READING READINESS TO EDUCABLE MENTALLY HANDICAPPED CHILDREN

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ABSTRACT

The paper focuses on a programme of reading-readiness for educable mentally handicapped children specifically preparing educable mentally handicapped children to begin reading in a special school; their IQ is taken to be between 50-75.

I have used the American Association of Mental Deficiency's definition "Mental retardation before to significantly sub-average general intellectual functioning existing concurrently with deficits in adaptive behaviour and manifested during the developmental period".

The term "reading readiness" refers to the collection of integrated abilities and skills that the child needs in order to learn the complex process called "reading". The components for which the programme is suggested are as follows :

1. Functions - include visual discrimination, reception, association and memory.

2. Auditory Functions include auditory discrimination, reception, association and memory.

3. Speech and language development.

4. Physical and motor development.

Such a programme is felt to be essential before an educable mentally handicapped child can begin reading.

Though it requires a lot of patience, it is our duty to help these children to achieve as much as they can to enable them to adjust in day to day life.

Our education system is based on the assumption that all children are alike and that all learn at the same rate and by the same methods. In fact, children differ biologically, psychologically and socially. Individual children learn differently and at different rates. It is for this reason that not all eight year old children learn to read at IIIrd Standard level and not all children can master Ist Std. reading material at the age of six.

The major goal of education is to develop each child to his/her maximum potential; for a particular child, we donot know what that potential for reading is. Our objective, therefore, must be to provide every child with the widest possible opportunities and to remove, if possible, any conditions or factors inhibiting the child's ability to learn.

The children with any problems in learning are categorised and labelled, however, a description of the child's learning problems is necessary. The classification and labelling of children who develop at a slower than normal rate; has been the subject of much discussion. Mental Deficiency Classification System. "Mental retardation refers to significantly sub-average general intellectual functioning existing concurrently with deficite in adaptive behaviour and manifested during the developmental period".

Unfortunately, the problem of terminology for different grades of retardation has not been the same for the different groups interested in the mentally retarded.

Attempts have been made to obtain satisfactory terms because of the stigma associated with "mental retardation". The classification on IQ though loosely formulated and controversial, eliminates terms often found objectionable to children and the parents, however, it does not help the teachers. Kirk and Johnson IQ 0-25 - Total Care.

IQ 25-50 - Trainable mentally handicapped.

IQ 50-75 - Educable mentally handicapped.

This classification implies certain educational attempts-little or none for those needing total care; readiness activities for the trainability implise improvements in the skills of self-care, sociolization and economic usefulness under protective suspervision. Educability implies the possibility of developing some degree of independent behaviour by careful training. This implicit goal-setting has been found by teachers to be quite useful, thus, accounting for the growing popularity of this classification in educational circles.

The programme for educable mentally handicapped is more inclusive and penetrating than that designed for the trainables. It is important to adjust to a varied developmental, corrective and therapeutic programme of activities appropriate to the child's specific needs. Thus, at the primary level, it seems important to concentrate on sensory and muscular improvement. At the elementary levels, the emphasis is on learning academic tools while in junior and high classes, vocational practice is stressed. The specific needs can be determined by case-study and follow-up procedures with continued revaluations over a period of time.

The focus of this paper is on teaching reading readiness to educable mentally handicapped children. One might wonder why is the teaching of reading to educable mentally handicapped children important ? It is apparent that in today's world failure to learn to read places severe social and business restrictions on the individual. While the inability to read or write was both common and accepted a few generations ago, in today's world a failure to do so. closes many avenues. An educable mentally handicapped child is afflected by several disabilities. It becomes our duty to minimize the impact of these disabilities as far as possible.

The characterstics of mentally-retarded provide cues for the procedures to be followed.

1. They show poor powers for generalizations; they have difficulty in applying to a new situation what has previously been learned. In other words, they have difficulty in cognitive skills and memory.
2. They have specific, concrete reaction; circumstances do not seem to be taken into account while deciding issues.
3. Mentally handicapped children are quite egocentric.
4. They hawe poor integration capacities. They are unable to fit parts into wholes.
5. Mentally handicapped children have difficulty in perceptual-motor or sensory-motor learning. They may have an awkward gait, be poor in motor activitieslike throwing or catching a ball; poor fine motor skills like buttoning or unbuttoning. They may be hyperactive and so cannot concentrate on the given taks.

6. They may exhibit difficulty in visual or auditory perception.
7. They have inadequate expressive or comprehensive language.
8. They have deficits in social skills, that is, lack of sensitivity to people and poor perception of social situations.
9. As a result of these handicaps and others which are inherent, they learn slowly, inefficiently.

These characteristics may form the basis for specific techniques of teaching mentally handicapped children, particularly the educable mentally handicapped. Whatever the programme that is designed, it is necessary that the teacher has realistic expectations. The expectation of achievement level depends on the child's mental age. Teachers and pupils will find it frustrating if the teacher spends a lot of time and effort in trying to get the pupils to achieve at their chronological age level. Realistic academic goals may be formulated as an honest interpretation of the child's abilities to his parents. The parents, too, need to adjust their expectations more to mental age than to chronological age.

In the context of the paper, teaching of reading assumes primary place; it is the basic tool for all other academic learning. Reading skills are needed throughout the life, whatever the child assumes as a vocation in adult life, be it a sheltered work-shop or something else. Preparing them for learning reading is in a way, preparing them for

future life. They will not be able to learn as a "normal" child in school but will be able to recognise and write alphabets, simple sentences. Reading will also prepare him for speaking by increasing his vocabulary and language.

Till recently, psychologists, social workers and other personnel involved with mentally retarded children concentrated on teaching them self-help skills. It was thought that they are not capable of learning the three R's- reading, writing and arithmatic. This concept is changing fast and is being replaced by an emphasis on teaching academic skills to educable mentally handicapped children. This broadens their limited world and also increases the opportunities for independence, however limited. They acquire a sense of achievement which adds to their self-confidence.

A person begins working with an educable mentally handicapped child keeping in mind his handicap and not having high expectations. A failure to do so will result in frustration; one must have and show confidence in the child's ability to learn which stimulates the process.

The term "readiness" refers to a state of development that is essential before a skill can be learned. For example, readiness for walking requires a certain level of development of the nervous system, adequate muscle strength and motor skills but until the infant has these abilities, attempts to teach walking will be premature and unsuccessful.

The term "reading readiness" refers to the collection of integrated abilities and skills that the child needs in order to learn the complex process called "reading". Research and observations suggest that many components contribute to reading readiness, the important ones being :

(a) Mental maturity

(b) Visual ability

(c) Auditory ability

(d) Speech and language development

(e) Thinking skills

(f) Physical fitness and motor development

(g) Social and emotional development

(h) Interest and motivation.

These factors comprise a systems network in that they interact and interrelate with each other; an educable mentally handicapped child is deficient in most of these aspects. However, the acquisition of a prerequisite skill does not assure that the child will learn to read, it means only that the child is better able to benefit from reading instructions.

Many educators believe that a minimum of 6-0 and 6-6 years of mental age is necessary for a child to learn to read. However, a child's mental age does not accurately determine the child's learning abilities. Learning can be influenced by materials and individualized help.

Thus, it seems logical that educable mentally handicapped children are prepared for learning reading. One has to be very careful and aware of the limitations

while chalking out a reading-readiness programme for these children. To develop a specialized programme, the following are essential :

1. The child's strengths and weaknesses should be evaluated to aid in programme-planning.
2. The instructional programme should be based on task analysis.
3. The programme should provide for success experience and aim at minimum change to ensure greater success.
4. It should be integrative. This implies that function like auditory discrimination is not trained in isolation but in relation to other functions like attention span meaning of words, etc.
5. The child's abilities should be used to train his disabilities if a child understands a picture but not the word, present the two simultaneously.
6. Abilities should be developed functionally, if a child has problems in visual discrimination, it is necessary to train him in discrimination of geometric figures and then alphabets. The activity should be transferable to life situation.
7. A teacher must determine objectives for a particular child and select the materials accordingly.
8. Multisensory approach should be used appropriately depending on the child's developmental stage and circumstances.

9. Feedback during teaching should be utilised. This implies three elements (a) what the teacher receives from the child in answer to a question (b) what the child receives from the teacher as a reaction to his response (c) what the child receives from his own body in terms of wocal on motor responses.
10. All activities should be presented gradually; the transition from simple to complex activities should be gradual.

There has been more effort, research and debate in the area of teaching reading than in any other area of school curriculum. The controversies about the best method of teaching still prevail, specially concerning the mentally handicapped children. Achievement tests, alongwith classroom observations indicate the level of teaching materials appropriate for the child.

Now, I will discuss the constituents and development of four aspects involved in reading readiness :

1. Visual functions
2. Auditory functions
3. Speech and language
4. Physical and motor development

I. Visual Functions

A number of educable mentally handicapped children, whose eyes are apparently normal, have disorders in the following :

1. This refers to the ability to visually discriminate likeness and differences in objects, geometric shapes, pictures, letters and words. To develop this, following can be done :

Select a series of animal pictures (e.g. 4 cats and 1 dog) and ask the child to circle the picture of the animal that is different. In addition to known objects, geometric designs may also be used to detect differences.

(b) Point out the likenesses and differences in objects in the class, e.g. table and chair, plant and animal, etc. Such a discussion facilitates language and memory for sentences and ideas.

(c) Collect objects and ask the children to sort them out

(d) Drawing activity to help visual discrimination

(e) Use peg-boards, blocks etc. to duplicate designs

2. Visual Reception

This refers to the ability to understand the significance of what one sees. The child may have difficulty in translating visual symbols into meaning or grasp the meaning of the picture.

(a) Recognition and differentiation of simple objects of different shapes, sizes, and colours. Begin with circle, triangle, square and then to more complex shapes like face, letters, etc.

(b) Organise field-trips to give the child knowledge and experience of which he may be deprived, being a handicapped child.

(c) Help the children observe and talk about what is seen through games like who can see most objects on the table or in the room.

3. Visual association

This refers to the child's ability to relate two or more things presented visually.

(a) Help the children verbalize and point out comparable parts of an object and its picture.

(b) Identification of opposite concepts presented in visual forms, beginning with tangible characteristics, like big-small.

(c) Simple jigsaw puzzles to fit parts in whole.

4. Visual Memory

In order to read, the child needs to remember what is seen-letters and words.

(a) Show the child a simple pattern. Remove it and ask him to draw from memory what he has seen. The complexity of the picture may be increased gradually.

(b) . Show the child a picture and after removing it, ask him to describle the items in the picture.

(c) Memory games e.g. place many objects on the table. Let the child look at them and ask him to describe them.

(d) Develop memory by asking him about what he did at home, what he eat, where did he went, etc.

II. AUDITORY FUNCTIONS

Educable mentally handicapped children may show difficulty in this respect even though there may not be anything wrong with their central auditory functions.

1. Auditory discrimination

This refers to a difficulty in differentiating between similar sounds (doorbell and telephone ring) or similar words (pen and pin)

(a) Give a series of words that rhyme together with one odd one out which the child has to find - rat, cat, foot.

(b) Give a series of words with same initial sound and one different which the child has to find table, tail, ball.

(c) Identification of different sounds through tapes or words.

2. Auditory reaction

Difficulty here implies a difficulty in deriving meaning from spoken language and symbols.

(a) Recognition of simple sound - ring a bell and ask the child to raise his hand when he hears it.

(b) Use tangible reinforcements to motivate listening attitude.

3. Auditory association

An educable mentally handicapped child with a deficit in this area needs help in organising and interpreting ideas received through auditory channel.

(a) Two concepts related to each other - loud and soft and small.

(b) Since this is the beginning stage, one can ask him to form sets of objects.

4. Auditory memory

They may have difficulty remembering what is heard long enough to repeat it. Learning to talk depends on the child's ability to imitate words and sentence in the environment.

(a) Tap on the desk and ask the child to repeat the rhythm

(b) Rhymes within their comprehension.

(c) Simple concepts may be taught - on, under, etc.

III. SPEECH AND LANGUAGE DEVELOPMENT

The speech of an educable mentally handicapped child may be delayed and he may have difficulty in comprehending simple words or instructions. Since speech and language are prerequisites for reading, these must be taught. The best way would be to assume that the biological structure of human being is essential for acquisition of language, but that it develops by imitation and reinforcement and that its complexity increases by stages at different periods of a child's life. Since these stages are delayed in a handicapped child, speech and language stimulation is imperative.

(a) Demonstrate what you want the child to do to ensure understanding and participation.

(b) Tell the child what he is doing to build up his vocabulary and knowledge.

(c) Give the child something to talk about and encourage him by showing enthusiasm. Pay attention to what he says and reflect back to him.

(d) Give the child a chance to talk, it requires patience to wait for the handicapped child to struggle to find the correct word, but do it all the same.

(e) Don't correct the child every time he makes an error this may discourage him.

(f) Physically and mentally get down to his level. Play what he wants to and encourage him to talk; repeat the activities he enjoys most.

(g) Be flexible, if your plan is not according to what the child wants, be spontaneous; learning material for language development are everywhere.

(h) Encourage the child to talk about what he did at home, what he ate, etc.

IV PHYSICAL FITNESS AND MOTOR DEVELOPMENT

Learning is an active process and requires the child to be alert, have energy and be able to concentrate. Medication may be necessary at times. Adequate motor development is a prerequisite of reading. An educable handicapped child shows difficulty in gross and fine motor skills.

(a) Games involving hand, finger and legs movements like dancing, exercises, etc.

(b) Outdoor games - running, hopping, walking on a line.

(c) Scribbling activities.

(d) Cutting and pasting, encourage the child to talk about what he sees in the picture.

All these activities suggested above must, preferably, be used in combination so as to develop reading readiness. An educable mentally handicapped child needs individual attention and an individualized programme. After a diagnosis has been made, a tentative programme may be worked out. After implementing it, evaluation of the performance must be done and modifications be made accordingly.

There are certain conditions that make the task of working with handicapped children very demanding. There are individual differences among them and an inherent doubt in the teacher's mind about their abilities. As the children move to increasingly abstract learning and functions, the limited ability of the retarded pupil to handle this learning becomes more obvious.

Medical knowledge about retardation is increasing. With this comes the need for more trained teachers and other specialists to work with them. The number of special schools in India, though small even now, is increasing fast with growing awareness. The task of working with these children may be demanding, but everyone has the responsibility of being sympathetic and understanding towards the people who are mentally handicapped through no fault of their own, public understanding, sympathy and interest in the handicapped offers a better future to these children. Seminars like this aid in arriving at a comprehensive view of the problem and discussion and solution to the problems one may face while working with handicapped children.

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5.0.0. Lead Paper

EDUCATION OF THE SPASTIC CHILD

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INTRODUCTION:

I must straightaway express my inability to cover this very wide topic with any justice to the space allotted to me. It will be seen that the handicap we are discussing always presents itself in a child in a complex and multiple form. Nearly every time it is a different combination of handicaps in different degrees of severity. Where the normal educator can afford to sometimes concentrate only on intellectual development the special educator can often start thinking of that aspect only after coping with the physical, sensory, social and emotional handicaps that many spastic children have. It would not have been possible to cover these other aspects in the length they deserve in a paper like this one. The emphasis on intellectual development that will be found in this article is in a way rather arbitary. However, instead of covering every aspect of special education in a general manner one felt one should attempt to cover a few aspects in depth. Remedial methods have been touched upon very briefly. A few books have been recommended at the end for the interested reader. The philosophy behind the "right" curriculum is crucial in influencing the special education that the spastic child receives. The

final section is therefore on the aims of education.

WHAT IS A SPASTIC:

Spastic is a lay term for cerebral palsy. This is usually defined as a "disorder of movement and posture resulting from a permanent non-progressive defect or lesion in the immature brain". There are four main types of physical handicaps namely spastic, athetoid, ataxic and a mixed type. This classification depends on the particular area of the brain that has been damaged, e.g. damage to the cortex appears to be the cause of spasticity while damage to the basal ganglia is perhaps the cause of athetosis. Different kinds of abnormal movement and posture characterise children suffering from these types of cerbral palsy. The ataxic child shows poor body balance, an unsteady gait and difficulties in hand-eye coordination. The athetoid is very different and shows frequent involuntary movements which clash and interfere with normal movements of the body. Writhing movements of the limbs, the face and the tongue, grimacing, dribbling and slurred speech commonly occur. The spastic child is charaterized by a marked rigidity of movement and an inability to relax the muscles.

These formal definitions and classifications tend to concentrate on the obvious features of the child's condition. The less obvious features such as the intellectual and emotional features may be the most important ones in understanding his needs and ways in which he may be helped. Further, it is the additional handicaps associated with cerebral palsy that crucially affect the

childs functioning. Brain damage not only affects the development of movement, but also in varying degrees, the development of intelligence, vision, hearing, speech and other functions important to a childs progress. Epilepsy occurs in about 30% of cerebral palsied children. 55% - 60% of all cerebral palsied children have visual defects of some type. Speech defects occur in 70%, hearing defects in 40% and about 45% have a mental handicap i.e. an I.Q. below 70. Mercifully not all have these handicaps in a severe degree. About two thirds are moderately or mildly handicapped but always there is a combination of handicaps which is very individual.

GENERAL LEARNING DIFFICULTIES

Experience Deprivation:

A syllabus planned for a normal child takes for granted a great deal of adequate and appropriate stimulation, and experiences which have helped him to develop mentally and physically. Many of the handicaps that a cerebral palsied child has have restricted his opportunities for acquiring critical experiences. Piaget has described how a baby must be able to combine what he sees, feels and hears and what he perceives and remembers. His later learning for example of reading and writing depends on much the same processes at a more advanced level. The mature adolescent phase of abstract, formal and logical thought is dependent on successful mastery of earlier stages. It is not surprising that many spastic children who have not had these earlier experiences run into difficulties

which become very apparent when they reach school. The educator must ensure that the spastic child has at least some of these critical experiences - if necessary bringing the environment to the child. It is a major task of parents, teachers, therapists to ensure that the natural exploratory drive and curiosity that most spastic babies are born with are not represses. To see what actual help can be given with the physical difficulties that impede expression of this drive which is so crucial for intellectual development. Brereton and Sattler (1965) have excellent recommendations for the experiential and conceptual development of the multi-handicapped child. It is important however to remember not to over stimulate children with learning disabilities and to help them perceive and categorise in ways which will make experiences meaningful.

In a similar manner the spastic child may have inadequate opportunities for social relationships, for appropriate language stimulation and this deprivation must be compensated for through the curriculum.

Emotional barriers to learning

Gardner and Bowley (1957) point out how spastic children with the handicaps that have been described are sometimes quick to realize that their efforts do not match up to what their parents expect or to what other children accomplish, hence their self confidence and morale are likely to suffer, they become over anxious about failure, and give up so quickly that their learning

advances only at a very slow pace. Our experience is that such emotional barriers are often present. Behaviour modification techniques have been found very useful with spastic children at the centre for Special Education in Delhi. It must be pointed out however that we not not usually require contrived contingencies like sweets, points and stars. Indications of progress or approval by the teachers suffice. If contrived reinforces are considered necessary they are gradually eliminated. The teacher often finds it necessary to programme her instructions.

It is necessary to mention here how imperative it is to include creative expression through play, art, drama language, music in a curriculum for such children. A great deal of work has been done proving the therapeutic value of such activity and enabling specialists to analyse the creative work done by children. In our Centre in Delhi, Komal, a severely physically handicapped 10 year old spastic child of above average intelligence did a drawing or Diwali coloured entirely in black. This led to an enquiry by the teacher who wondered why such a colour, considered by therapists as very negative had been used. An essay was dictated by Komal. It emerged that a firework had landed on his foot a few years ago, his handicap did not allow him to remove his foot which was slightly burnt. Help came in a short while but the child has been petrified of Diwali ever since. Deeply rooted fears, inhibitions and frustrations can sometimes only be expressed creatively. A wise choice of themes by the teacher and encouragement to express freely, we find, works wonders.

SPECIAL LEARNING DISABILITIES:

Cerebral palsied children who have abnormal brain function must be considered to have complex handicaps when they are being assessed. In addition to the physical handicaps there is often some general or specific intellectual impairment; there may be perceptual disorders; there may be sensory handicaps and there may be speech and language disorders. Specific learning disabilities are responsible for the unevenness in the intellectual and educational performance of cerebral palsied and, ofcourse, other brain damaged children as well. Wedell (1960) using very carefully devised tests on 73 cerebral palsied children and 40 controls without brain damage showed the difficulty the former had in tests involving the matching of figures, copying patterns of bricks, assembling jig saws on which low scores were recorded on 24% of the brain damaged children compared to less than 3% of the controls. The tests were specially designed so that the child's motor control was not an important consideration. Abercrombie (1964) confirmed that there was a high incidence of perceptual disorders amongst cerebral palsied children in her extensive study of 29 cases and 11 controls using the Wechsler Scales, the Frostig Developmental Test of Visual Perception and various matching tasks, both through visual and tactile means. The degree to which the children and sensory or motor handicaps was carefully assessed so that the influence of these could be allowed for. 75% of the cases showed specific perceptual motor difficulties on one or more of the tests which could not be attributed

to motor or sensory handicaps; children with equal degrees of motor handicap, but who were not brain damaged (e.g. cases of poliomyelitic) did not show such difficulties.

However, sometimes, perceptuo-motor difficulties are not due to perceptual disorders themselves but its somewhere in the process of translating a perception into action. The work of Birch (1965) and others show that some children with neurological deficits have quite good visual perceptual skills (e.g. they can match picture to picture and shape to shape fairly normally) but cannot construct patterns either through making patterns with coloured bricks or attempting to draw them. In a similar manner when assessing difficulties in auditory perception, careful attention must be paid to differences between input and output, becaus , as Dehnson and Myklebust (1967) have pointed out, children with difficulties in understanding language present a different remedial problem from children whose output processes are affected, although speech resulting from both input and output handicaps may be impared.

By using specific techniques it is possible to educate more efficiently children who otherwise show such a severe learning disability in certain areas that overall they present as mentally subnormal and function as such in learning situations. Many highly specialised remedial programmes are available. The perceptual remedial programme developed by Mariane Frostig in her centre for educational therapy in Los Angeles is available in all the special schools for Spastic in India. The areas of visual perception postulated by Frostig, are figure ground perception

positions in space, perceptual constancy, spatial relations and eye-hand coordination. In the Teachers Guide there are many useful suggestions for three dimensional exercises which can precede and accompany the pencil and paper work sheets.

Kephart has suggested another approach to the remediation of perceptual motor difficulties, i.e. through the motor base of achievement. A detailed plan for remediation is outlined in The Slow Learner in the Classroom. (Kephart, 1960) Apparatus such as walking boards and balancing boards are used for some of the motor training and the blackboard also figures prominently. A detailed account of a very comprehensive remedial programme for children with a variety of disabilities in language, including both receptive and expressive aspects, disorders of reading, written language or arithmatic or non-verbal disorders of learning is given by Johnson and Myklebust (1967). The educational implications of distractibility have been carefully studied by Cruickshank who has advocated radical educational measures such as setting up "distraction free" classrooms, which are relatively bare, silent, small cubicles providing a visually neutral background against which the work material could be thrown with relief.

Not a great deal of research has been done system - atically evaluating these different remedial methods. One problem is the ethical one - it is difficult to establish a control group and deny handicapped children the special education they urgently need during the time of the trial.

There are a few studies of remedial methods. For example, Tyson (1963) studying the Frostig remedial method on a small group of cerebral palsied children and Horn (1970) studying non cerebral palsied children who showed perceptual motor difficulties found that such remedial work on the whole tended to produce slight improvements in terms of increased scores on the Frostig perceptual tests, but not necessarily in the educational attainments so far. Cruickshank's recommendations with regard to the education of distractible children have been challenged by the findings of Brown (1978). Brown's studies among 28 severely subnormal children attending a Junior Training Centre found no differences in the children's performance scores in their usually highly decorated nursery type classroom and their scores within a bar experimental environment, it "comes from within". However, one cannot help feeling that a distractible child can probably be helped a little by having an environment that does not contain too many diversions although his difficulties cannot necessarily be solved in this way.

Scientific studies of the long term results of such training programmes are not yet available. This is partly because of the tremendous complexity of these learning difficulties as well as the difficulty mentioned earlier with regard to controlled research. Perhaps a word of caution is advisable at this stage of our knowledge, One influential school of thought recommends, with regard to perceptual deficits, that the curriculum time could be better devoted to an all round multisensory reading readiness programme playing to the child's abilities

rather than his handicaps, we must remember that researchers have found such learning disabilities to be also present in the normal school going population and that many normal children have coped with those without special intervention. Our experience with teaching cerebral palsied children at the centre for Special Education in Delhi leads us to recommend discriminating use of programmes designed to remedy specific learing deficits, continuous assessment of the specific remedial programme that is being used and constant attempts to encourage the child to use his unimpaired learning abilities to compensate for those that are disabled.

SPEECH, LANGUAGE AND COMMUNICATION:

About 70% of children with cerebral palsy suffer from speech difficulties. In mild cases they present as a slurred and slow articulation, lacking the usual sentence rhythms, yet are quite intelligible if one concentrates on listening to it and becomes familiar with its rate and odd rhythm. In other cases the difficulty is so severe that they are unable to communicate through speech.

Many cerebral palsied children show relatively high development in certain intellectual areas but their language development is relatively low. Renfrew (1972) claims that the large majority of cerebral palsied children seen by her during speech therapy sessions have impairments in understanding speech which are not caused by deafness. It is her opinion that in these cases children hear speech sounds and words and can often imitate them accurat - ely but fail to perceive the meaning. A kind of special

learning disability that only a speech therapist is really equipped to deal with. However, many more have poor language development because of environmental factors. At every level of experience the cerebral palsied child is often handicapped. The great majority of young children remain at home day after day in the same room meeting only the family circle. They have few opportunities for showing initiative, developing independence or even just being naughty and having to the reproved. Consequently there is little to talk about and little to think about. It is no wonder that language is limited in vocabulary and information content. Many of them have such difficulty also with the mechanics of speaking that they say little and lack the experience of putting their thoughts into words. Normal language development depends particularly on "social imitation" and the desire to communicate through speech, both on the part of the child and the persons surrounding him.

Special advice and attention regarding communication difficulties such as in writing and speech is essential during the early years of the majority of cerebral palsied children. It is vital that parrents are alerted about the necessity for language stimulation in the early years. There are several ingenious communication systems that have been developed for children who are non verbal and/or have very poor hand function. For the non reader, picture and other simple symbol boards are used for communication. The Bliss symbol method allows the development and use of a 1000 or more word vocabulary word boards are used by readers. Rubbe stamps, different

kinds of typewriters, rotary printers, electronic teaching machines which require only breath control (if that is all the remaining residual function) - these are some of the range of hardware available to the special educator teaching a non verbal child with poor hand function. All these are available at the few special schools that exist for spastics in India and the cheaper aids, like rubber stamps are being developed and manufactured in India now.

PHYSICAL DEVELOPMENT AND INTERDISCIPLINARY MANAGEMENT

Every special school for children suffering from cerebral palsy has a theraphy department with physio, speech and occupational therapists. In the best schools there are few barriers between the departments and there is interdisciplinary management of the child. The occupational therapist combines perceptual training with useful hand function work. The teacher and physio therapist lead group movement sessions which have educational goals as well. The speech therapist carries out her theraphy using reading materials from the class and reinforcing the work done by the teacher. The special educator encourages children in class to correct abnormal posture so as to avoid secondary deformities. A spastic child has no more time at school than a normal child yet he has many more urgent needs for expert help and teaching. It is only with interdisciplinary management that these needs can be satisfied and teaching and learning time used optimally. Useful research is needed in developing interdisciplinary methods of teaching. The Peto method is of particular relevance to the treatment and education

of severely handicapped cerebral palsied children. This was developed in Budapest by Professor Peto. The training programme is a highly structured one and the day is carefully programmed. The aims are to promote general body control by intensive training in achieving the daily functional skills required by children. The programme has educational and language inputs, makes little use of aids and is carried out by a 'conductor' and her assistant in a particular area devoted to the programme. It is less fragmented and the highly trained conductor acts as physiotherapist, speech therapist, occupational therapist, teacher and nurse. Some of the principles behind this method are being implemented in our Centre with severely physically handicapped young spastics of normal intelligence and while there is no scientific evidence of it being a better method as yet than some other we are generally very pleased with the results.

While it is outside the scope of this paper to discuss different kinds of therapy for the spastic child, it is necessary to emphasize the importance of weaving into a syllabus the physical goals of the child. It is a spastic child's physical capabilities like hand function and speech very often which are crucial in determining his independance, his ability to make friends, the work opportunities available to him - in fact, the quality of his life. A special educator of cerebral palsied children is trained in the rationabe behind the different therapies and treatment aims. Case conferences are held in special schools for spastics at least bi - annually to interweave

the different goals for each child.

EDUCATION OF SPASTIC CHILDREN WITH ASSOCIATED MAJOR HANDICAPS

It has been seen previously that a high percentage of children suffering from cerebral palsy have major associated handicaps like general mental retardation, visual handicaps and hearing loss. Sometimes these handicaps can be compensated for with aids like hearing aids, specially wired classrooms so that the partially deaf spastic child can hear all the sounds in the classroom area, special printed material for the partially sighted, special magnifying glasses etc.

When the associated major handicap is severe the teaching expertise required for a blind, deaf or mentally retarded child needs to be combined with the know how available in a special school for spastics. Fortunately, such cruel combinations of cerebral palsy and uniformly severe major handicaps are rare.

AIMS OF EDUCATION FOR THE SPASTIC CHILD.

For the not too severely handicapped the aims of education can be very similar to those that are advocated for ordinary children - a blend of aims, of self-fulfillment, of the development of potentialities, intellectual, physical, emotional, the aims of working towards a career and of service to the community. These various aims are not always completely compatible for ordinary children: for the handicapped even greater difficulties are apt to arise. The presence of a considerable handicap means that

achievements are bound to be low in certain areas. There are many questions and few confident answers. There are such few work opportunities for the handicapped, should an intelligent severely physically-handicapped spastic in India concentrate on self-fulfilment aims such as his interest in art and informal reading or should he concentrate on academic work like Hindi and maths that may lead to examination successes. Should more curriculum time be spent on improving the child's motor skills through intensive training methods like the Peto method? As there are such few work opportunities for spastics, should we abandon the idea of working towards employment for gain - and concentrate on self-fulfilment activities? Or should organizations providing research for spastic create work opportunities and provide schooling services simultaneously? In the meantime we require the development of different educational strategies which will suit the financial constraints that exist in this country and which will be responsive to the differing social, and economic milieu's that spastic children live in.

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2.02.0 Lead Paper

Research in the Education of the Blind

By
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The N.C.E.R.T. needs to be commended for selecting the Education of the Disabled children as the general theme for its third All India Conference on Educational Research. Coming as it does in the current International Year of Disabled Persons this Conference, I have no doubt, would serve to bring into sharp focus the Research needs as also to evolve practical & feasible research techniques, which would, in turn, open up newer & more diversified vistas of Educational opportunitise for blind children & other categories of the handicapped.

Problems & Perspectives :

While discussing the vital role of research in the education of the blind, we would do well to clear the decks & consider the perspectives we would employ & the problems we encounter. Broad conceptualisations of research in the education of the blind must be concerned with problems which are new in educational research as conceived generally. These problems arise from two major sources; (a) Sources the very small & scattered population of blind children available for study & consequently, (b) The almost insignificsnt number of researchers who choose to work in this field.

Of the estimated 250,000 blind children in the country, only about 10,000 are believed to be in schools for the blind whose number is no more than about 225. The enrollment of children at these institutions ranges from about 200 to just 10 to 15. The number of childrem in a particular class & age group in a single school, is often too small to permit research, let alone encourage it.

Also, to date, there is no formal university-level programme to prepare research workers in the field. Doctoral work in the educational problems of the Blind is conspecious by its absence. All that it available in the name of research in the country is isolated & defused desertations by a few M.Ed. students & some projects sponsored by a couple of voluntary organisations & the Union Ministry for Social Welfare Not a single university offers degree course in the Education of the Blind & the number of Universities having such courses for all categories of the handicapped, under the title of "Special Education" is also almost negligible.

No less distressing is the fact that the importance of research in the field tends often to be undermined even described, in the face of what are supposed to be weighier matters demanding early solutions. And, then of course, there is the chronic problem of resource constraints.

GUIDELINES FOR RESEARCH:

An obvious out come of the problems indicated here is that research in our field cannot be other than severely limited. For this reason, it is critically essential that whatever research is undertaken, be planned to provide maximun returns for the efforts expanded. The following guiding principles are suggested to achieve this end :

1. Research should be problematic, in that problems should be persued to their solution. Where ever applicable, the solution should include a product & the necessary instructions for its use by the students, teachers or other workers.

2. Emphasis should be laid on action based applied research, instead of research for the sake of it. In undertaking & planning a research proposal, the sponsoring agencies or individuals must be convinced that their programmes would be of some tangible use for the blind child or his teacher & that they are able to draw upon other related disciplines for background information.

3. Every effort should be made to off set the effects of the smaller number of subjects available for study through use of precise experimental designs, at the same time concern for the preciseness the experimental design should not preclude seizing unique opportunities for study. In many instances, case studies carried out over a longer period of time, present the only opportunity for systematic investigation.

Goals & Outcomes :

With these basic principles in mind, we can now proceed to consider the special goals of research in the education of the blind. It is often stated that education of blind children is essentially identical to the education of all children. Certainly, the goals are the same. Why, then, do we talk of the need for a special research effort & the justification for this specialized attention lies in the fact that the perceptual development of blind children & the need for detailed analysis & description of their characteristic modes of perceptual behaviour are concerned with realms distint from those of other children. Another important goal here concerns educational technology where our concern should be with developing educational media & techniques best suited to enable the visually handicapped child to reach the common educational goals in the light of his particular perceptual development & perceptual behaviour.

Finally, research activity in the field should have for its purpose the development of precise indicators & predictors of academic success & the criteria to assess the degree to which outcomes of research in educational techn-logy enable the child to meet curricular goals. Thus, educational research here concerns itself with educational media, educational techniques for the teaching-learning process & the means for assessing mastery of assigned tasks.

Specific areas of research :

With this background in mind, specific areas of needed research can be identified. The list of research areas of problems indicated here is not exhaustive, but is believed to represent the range of most important & pressing problems. These research areas include : cognitive development, communication skills, special curricular needs, school placement programmes & attitudinal aspects.

1. Cognition : This refers to the process by which the individual gains knowledge of or becomes aware of an object. It is within this realm that critical differences exist between the blind & the sighted child, which have such significant implications for education. The following problems merit special mention :

(a) Tactual perception : We still have very little idea of the process by which textures are tactually discriminated. Such information is crucial, of course, for the design of maps & other tactual graphics. At the sometime, no reliable information exists regarding what factors determine figure- ground relationships in stimulus fields.

Are differences in surface textures significant, or, in other to be a figure, must the tactual form be higher than its surroundings? Can a tactual figure be depressed below the surface of the stimulus field? How is a total form synthesised out of a piece meal tactual inspection of its parts? How valid & complete is the perception? How do these factors vary with size & complexity of the stimulus field? These questions are yet to be authentically tackled.

No information is available describing the degree to which patterning occurs in perceptual organisation of tactual stimulus fields. Results of inspections of many tactual maps & charts in Braille Books & in other sources appear to indicate that the designers of such text books presume that such patterning takes place, but no emperical evidence exists to support this notion.

(b) Perception of space : How do the Blind develop their concepts of space? How accurately is space percieved? And what are the roles & limitations of various sensory channels in space perception?

Answers to these questions have implications for mobility instruction as well as for instructions in mathematics & other sciences.

(c) Visual perception : A large number of children falling within the category of being levally blind, still retain varying degrees of residual vision. Study is, therefore, needed of ways in which a visually handicapped child can make optimum use of his residual vision development of training techniques to encourage maximum use of residual vision is of vital significance.

(d) Concept Development : Visual deprivation results in a great reduction of direct and vicarious contact with the enciironment. As a consequence, the proportion of experiences that must be classified as abstract, is greatly increased for the blind. The significance of this factor for concept development has long been of interest. However, its implications for education are yet to be fully explored.

2. Communication through Education :

Educational communication is an area that is affected greatly by the perceptual differences between the visually handicapped and non-handicapped children. Rates of communication are much slower when tactual reading medium is employed. Greater emphasis is laid on aural communication is the education of the blind because of this limiting factor.

Many problems of research exist in this area, some of which are outlined below :

(a) Reading Readiness : In the pre-school years, the possibility of retarded cognitive development resulting from the inability of the visually handicapped child to contact varied aspects of him environment directly or otherwise, is further increased because of the ignorance of parents. Research and development can bear upon the readiness problem in several ways. First, development and evaluation of programmes to work with parents and/or children, prior to school-entry. These programmes could train parents to provide the blind child with a variety of experiences necessary to maximum cognitive development during these years.

Secondly, development and evaluation of materials and techniques for use in pre-school training sequences. While many toys etc. commonly available, should be suitable for use, special adaptations and instructions for their use may be required.

Thirdly, development and/or adaptations of tests and scales to measure different attainment levels.

(b) Braille Reading : For many years, educators have dwelt upon the differences between visual and tactual reading. Intensive exploration and identification of these differences as also their implications for education, is required.

(c) Curricula for teaching Braille Reading: It is necessary to design special learning materials and text-books for use as aids in teaching Braille to blind children on the basis of our existing knowledge of differences between print and Braille reading and the related perceptual aspects.

(d) Increasing Braille Reading Speeds : It is believed that the average reading speed of a blind child is about 80 to 90 words per minute. Intensive efforts to develop training methods for maximising reading speeds of Braille are, therefore, urgently needed. We have also the task of developing and evaluating measures to assess progress in the refinement of Braille-reading skills, as well as to help diagnose causes of defeciencies.

(e) Listening as a substitute for Reading : The very slow rates at which Braille is read, imposes a severe limitation on the child in gaining access to educational information. Use of recorded texts is, therefore, advocated

to enable the blind child to get easy access to the print word and study it faster. The shortage of books in Braille also makes learning through listening important in its own right. What we have to do is to identify precisely the grade-levels and curricular areas where listening could substitute or supplement Braille reading, as also to determine the relationships of such factors as chronological age, intelligence and motivational aspects. It is also worthwhile to examine carefully the feasibility and advisability of introducing our blind children to methods of reading through listening at accelerated rates, an experiment already tried out overseas. The implications of factors such as levels of grade, age, course-contents and intelligence, for learning through listening to speeded word-rates need exploration.

3. Curricular Needs :

Perhaps, the most vital role research has to play is the education of the blind, concerns meeting adequately the special curricular needs of blind children and we would, therefore, discuss this aspect in some detail.

It is, indeed, pathetic that some subject areas or sections thereof are still considered beyond the reach of blind children. For example, we have, so far, been able to pay very scant attention to mathematics as a full-fledged subject is our schools for the blind. Four aspects of this important subject area needing close and early investigation, are :

Developing suitable materials to give number concepts to blind children; devising ways and means to facilitate the adoption of Modern Mathematics in our schools; developing concrete materials for teaching complicated Mathematical concepts and techniques for use of these materials; designing tactual drawings, graphs and charts for use in this area. Of no less significance is the need for reliable investigations to devise and standardise a Mathematical Braille Code to ensure uniformity in symbols used in Braille text-books on the subject.

It is tragic that in this age of science, the blind child is denied the opportunity of studying Science through regular laboratory methods. There is, thus an urgent need today, for research in the area with the object of developing appropriate Science experiments and demonstrations, which blind students could perform independently or with minimum of sighted help. This development should be closely related to modern Science curricula. Its primary goal should be to express Science concepts through the display of natural phenomenon within the ranges of sensory capabilities available to the blind. For this purpose, it is essential that we impress upon our scientists and engineers the urgency for developing suitable instrumentation and gauging devices, so that the blind child is enabled to partake of the thrills and excitement of carrying out practical work in Science.

One of the greatest losses of blindness is that it severely restricts the individual's ability to get about.

Both mental orientation and physical locomotion, two of the essential ingredients of efficient mobility, could be seriously jeopardised. Training in orientation and mobility has, therefore, to be an integral part of the curriculum in schools for the blind. In our country, a great deal of practical research is needed to make training in this vital area a success. What kind of activities should be planned to adequately orient the blind child to his environment? When should the child have his first lessons in foot-travel with the help of a white cane? What role do secondary sensory abilities such as those of kinesthesis and vestibular sensibility play in aiding independent mobility and how to ensure their optimum development? How can we best help the blind child in developing the sub-abilities of sound-identification, sound-localisation, sound-allighment and tactual perception of terrains and ground levels? These and other issues relating to the proper manufacture of dependable canes need to be examined in depth. At the same time, we must also explore the possibility of devising suitable Ultra-Sonic devices in the field of mobility for the blind.

Another special area of equal importance for effective education of blind children relates to imparting them training, at an early stage, in the various skills of daily living which, in the absence of visual imitation, would remain outside the reach of the blind child, unless adequate training programmes are introduced at the right time. Here also, research, practical research, can help to answer some vital questions which are of marked relevance in a situation like

ours. What should be the principles and criteria for selecting and grading activities for inclusion in this programme? What special learning materials are required and what teaching techniques are needed? What are the effects of parental overprotectiveness or open rejection on the child's learning abilities in general and his potential to acquire independent life-skills, in particular? These and many other connected aspects need systematic inquiry.

However, as in the case of the non-handicapped child, education would be purposeless and stunted, if it is not suitably blended into a carefully designed programme of vocational training. Research has an indispensable role to play in vocationalising the education of the blind. The local work-a-day world has to be studied to suggest vocational areas for training in schools for the blind. Wherever desirable, adequate materials and accompanying training techniques have to be developed to fill in the gaps. Different facts of the Socially Useful and Productive Work, recently introduced in schools by the Central Board of Secondary Education, must be carefully studied to select suitable areas for blind children and draw up a phased programme of actiwities as a part of training.

4. School-Placement for the Blind :

Two widely differing plans for the education of blind children, are currently the subject of considerable debate and, even, controversy. On the one hand, there are special residential schools for the blind, sometimes called "Segregated schools" and, on the other side, there is the

integrated system of education for the blind, wherein the visually handicapped child receives education in a regular school alongside his sighted peers. In view of the low costs and the built-in potential for mainstreaming the blind child from very early on, the integrated plan is being widely recommended by the Government. However, in a country like ours where parental attitudes towards the blind child are found to be mostly negative and where social prejudice is presently too strongly embedded to allow free and equal participation in the activities of the community and the regular school, the success and efficacy of this educational programme needs to be objectively assessed. We have to have research-based recommendations about the relative roles of the traditional residential school programme and the integrated scheme with a dependable and practical list of remedial measures to plug in the loopholes in each of these systems.

5. Attitudinal Aspects :

All our programmes for comprehensive education and effective rehabilitation of the blind would be of little avail, if they are not simultaneously accompanied by compaigns of attitude-modification. For, as Hector Chevigny, an outstanding blind person, has remarked. "The tragedy of blind-ness does not inhere in the condition. The world in which the blind man finds himself creates the tragedy for him and in him".

It is absolutely imparative that research be initiated to analyse the attitudes of the parents of blind children, the school and college-level sighted students, the community

at large including prospective employers and, of no less significance, the blind themselves.

The Role of Government And Voluntary Agencies in Promoting Research

It is obvious from the above comprehensive list of areas requiring early investigation that no signal agency or even discipline can do much on its own. Research is basically a cooperative activity. A large number of people must lend in a hand to develop new gadgets or educational techniques and materials. Research, to be really meaningful in our field, has to borrow from a number of disciplines, blend this knowledge into a cohesive field whose principal purpose is to help a handicapped person towards better life and continually refine investigative techniques.

It is, indeed, heartening to note that the Government of India is alive to the need for promoting useful research in work for the blind. It convened in 1978 a National Seminar on Research in the Rehabilitation of the Disabled in New Delhi. The Seminar was attended by about fifty experts from various parts of the country representing different disciplines. It suggested an action-plan envisages the setting up of centres where new aids could be developed for the blind as also to carry out occupational research which might threw open new vistas of economic opportunity for the blind and suggest mechanisms for monitoring, evaluating and coordinating research efforts in the country. It is to be hoped that the recommendations of the seminar would receive Government approval early.

The recently established National Institute for the Visually Handicapped in Dehra Dun, under the Union Ministry of Social Welfare, has, among its primary objective, the promotion and diversification of research in related areas. The Ministry also provides liberal funding facilities to voluntary agencies having worthwhile research projects.

But state action, however effective, cannot be the sole motive force in sparking off the impulse of the scientific community and research workers to genuine and sustained dedication. The interest of the scientists, social scientists, engineers and others in this challenging field must be aroused and they should be convinced of the social usefulness of their endeavour. State as well as voluntary organisations working in the field have, therefore, to assume the role of crusading catalysts and tinder-box from which emanates an inexhaustible claim to kindle the interest of researchers from a wide spectrum of disciplines, to keep it alive till a crescendo of enthusiasm bursts forth into a rich harvest of devices, gadgets, techniques, materials and strategies. The voluntary agencies should also take the lead in gaining useful insights into various aspects of the education of the blind through carefully designed and coordinated research work.

Thus, research is, indeed, essential, nay, crucial, in devising and developing meaningful techniques and technologies for the education of the blind. What is needed is interested and enlightened research workers capable of completing the project successfully within the stipulated

time, and alert and sensitive educators and school administrators capable of implementing the research outcomes before their relevance is outmoded in this age of the explosion of knowledge.

Let the current International Year of Disabled Persons be the harbinger of improved, refined and diversified educational media, materials and techniques, so that the blind child might, in reality, be able to enjoy the fruits of "Equality and full participation", the theme for the I.Y.D.P. Research and systematic inquiry hold the key to opening out new and widening educational horizons for the blind.

4.01.0 Lead Paper

MENTAL HANDICAP : AN OVERVIEW, WITH SPECIAL REFERENCE TO RESEARCH IN EDUCATION OF THE MENTALLY HANDICAPPED

by

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Education and training of the mentally handicapped is the most important part of the entire programme of services for their care, management and habilitation. Diagnosis, prognosis, medical advice and treatment, etc., are all important, and should be a regular part of services offered to the handicapped. However, without education, these will only serve to prolong a vegetative or subpar existence, where the quality of life is much below that which is optimally possible. Not only do the mentally handicapped suffer by the deprivation of the highest faculty a human being possesses, but also, the treatment they receive from society is much that it increases their disability, leaving them functioning at a far lower level than they are capable of. The ridicule and aversion or frank cruelty of many so called "normal" persons helps to make psychological wrecks of the mentally handicapped. While we are considering special educational methods for the handicapped, we should not forget that education of the community in the understanding of handicap is also important. This is a generally

poorly understood condition, not limited to the poor and the uneducated. I have met senior government officials, educated persons moving in the most elite circles, and even social workers, who have asked me questions such as, "Is there any point in doing anything for the retarded? They can't enjoy anything anway, can they?" or "Such children are mad, aren't they?". It is essential that people understand what handicap is, before they can be expected to change their attitudes towards the handicapped, or to give any meaningful help to them. The aim of all education is to increase the quality of life, and to help a child to become an independent, optimally functioning, responsible and contributing member of society. This includes the development of creativity and initiative, the learning of new skills and the improvement of old ones. As a child learns and develops skills, he also develops self-confidence and a better self image - an image that is usually pretty badly battered in the mentally handicapped. Not only is increasing independence important, but also the enjoyment of life and of learning, which should be the birthright of all, whether handicapped or not.

To fulfil such an aim, we need teachers trained in modern educational methods, who are responsive to their pupil's educational needs. This needs a high calibre of teacher, and also enough teachers to be able to give individual attention to each pupil. The mentally handicapped, even more than those of normal intelligence, need such individual attention. Without it, their educational achievement will be much below their potential capability.

India is considered a poor country, and this is the reason or excuse we give for paying the majority of our school teachers a pittance. Even the miserable amount they get is often held up because of some red tape or the other. In addition, because we keep our teachers poverty stricken, society looks down on them, which further decreases the readiness of a child to benefit from whatever education he is exposed to. Because of all this, we have very few persons who are willing to take up teaching as a career. It is only either the very highly motivated, or those who cannot get any other kind of livelihood who will settle for teaching - mostly the latter. This is hardly the kind of situation in which we can discuss newer educational research.

The situation is even worse where teachers of the mentally handicapped are concerned. In some schools, they are not even paid on par with teachers of children of normal intelligence. Only in very rare instances are they paid more. Yet their work is much harder, and they do not get as much feed back as a teacher of normal children gets, in the way of watching a student showing fast improvement. They also need to know and apply modern methods of special education for the handicapped.

However, happily conditions are not quite as black in many of our urban areas, where the importance of education and of those who are responsible for developing it, is realised. We do have schools, though not many, where education is of a high standard. But we need urgently to reform the pay structure of those responsible for the education of our children, and especially of teachers of the mentally handicapped.

Not only is adequate pay needed, but even more important, the training of teachers. Hardly any places are available in India, outside two or three centres, where a teacher can become adequately trained in modern methods of special education. This area has been ignored by our educationists for too long. I am glad N.C.E.R.T. has decided to take up this area of work in addition to the very good work it is already doing. A well designed, one or two year, postgraduate course in special education, recognised by the university, with provision for immediate employment of its alumnii on satisfactory completion of the course, is sorely needed. Immediate absorption into suitable employment is essential to prevent brain drain to the affluent developed countries - a luxury we cannot afford. And yet we allow many of our gifted, trained personnel no employment, and no facilities, with the result that they finally emigrate - after which we throw up our hands in holy horror and cry "Money mad"!

A number of questions arise when we consider the topic of research.

Is there any need or scope for research in educational methods in India? Are we not too poor a country to indulge in such a luxury? Can we not simply apply the research that has been done in other countries?

I think the answer to these in both yes and no. We must apply whatever we can of basic research done elsewhere, as long as it suits Indian conditions. In this category come the learning process, effectivity of early

intervention programmes, many of the techniques of behaviour modification, the principles of structuring the educational programme and sequential learning of tasks, and many other principles and techniques of learning. The details of techniques will obviously vary with local conditions and cultures, expectations from the individual in relation to society, etc.,.

However, there are many problems - medical, educational and sociological - which are peculiar to India, and must be solved by us, ourselves. One of the most important areas of applied research is evaluation of all on-going service or educational programmes. This is a must for any programme - ongoing evaluation of its efficacy. In the field of education, the following projects could yield valuable information :

- Evaluation of the effect of different types of educational and intervention programmes on functional adequacy, speed of progress, or any other parameter, which could lend itself to a testing procedure.
- Study of formal as compared to non-formal education.
- Study of results of teaching by educationists alone, or in conjunction with village or local craftmen and artisans.
- Study of different types and methods of vocational training.
- Studies on the outcome of education in different types of schools : integrated, day school, or residential.

- Studies on the effect of different types of integrated activities, such as dramas, pen friendships, working on different types of projects together, for children of normal and of sub-mormal intellect.
- Standardization and adaptation of tests of intelligence and functional ability in the Indian population.

Social studies which may be valuable are :

- Study of the effects of different social conditions onfunctional adequacy - such as rural versus urban, joint family versus nuclear family conditions, homes with both parents working outside the home versus those with one parent at home, and so on.
- Study of productivity in industry of the mentally handicapped, compared to those of higher intelligence. (This could also guide the choice of work for such individuals).
- Study of adequacy in marriage of those who are mildly mentally handicapped or of borderline intelligence, compared to those better endowed.

Quite a few problems are already being worked on. Many intelligence tests have been devised which are suitable for Indian conditions. Educational and behavioural research is also being undertaken. But much still needs to be done. The field is wide open.

However, basic requirements of research are proper standardisation of methodology and clear criteria to be defined, before a study is actually undertaken. The whole research team must receive adequate training in research

methodology before a project is started. Standardisation of all tools and statistical evaluation of all results is a must. Unless this is meticulously done, research has no meaning. We see examples of "anecdotal research" all the time - high praise of some form of therapy or educational technique which may have been given, with some improvement noticed in a group of children, large or small. However, to call this research, and to state on the basis of it, that a particular form of therapy is better than another, it is necessary to take an exactly comparable group of children with all variables exactly matching the first group and to subject them to the alternative therapy, testing them by some rigid criteria, not just teacher or parent impressions. If impressions are to be relied on, a blind or double blind technique is necessary where neither the subject nor the assessor knows which type of treatment is being given. In the case of educational techniques, this will be more difficult than in drug trials. The cross-over technique, commonly used in medicine, would also be difficult to use in educational systems. In this technique a group of children taking drug A for say 3 months, will be assessed at the end of that time, and then be switched to drug B for another 3 months, being assessed after that time again. At the same time, an exactly comparable group of children will get drug B for the first 3 months, and switch to drug A later. Neither the assessors nor the patient will know what drug is being given. Assessment of the effects of drug A versus drug B will be by clear, previously decided criteria.

Results of the trial would be subjected to statistical evaluation for significance. Only after the assessment is done, is the code broken to allow the assessors or the subjects to know which drug was A and which was B.

Without rigidly adhered to methodology and statistical evaluation of all results, glowing accounts of some treatment or method can only serve as pointers, but cannot be taken as any proof of efficacy. In medicine, we see all the time the occasional child who is given up as lost. For example, a child who, after tuberculous meningitis, is discharged from the hospital in a near-vegetative state, of course, on continuing therapy with antituberculous drugs, will sometimes return after a few months, practically normal. This is improvement for beyond the usual. However, if this same child had had some religious or other type of intervention in the meantime, his improvement would have been attributed to the that intervention, rather than to just the antituberculous medications. For validity, statistical proof is needed. An adequate number or percentage of persons must respond to the new therapy for which claims are being made, and this improvement must be significantly better than the improvement with anti-tuberculous drugs alone, before any valid claims can be made for its efficacy.

Finally, all research must be ethical, and be directly for the benefit of the mentally handicapped, not for their exploitation. The handicapped are as human as anyone else, not laboratory animals.

In India, we have a country which, with all its disadvantages, has a great many advantages too, and these can be supportive to the mentally handicapped as well as to those who are not. We have much closer family ties than is customary in the west. This makes for a greater feeling of security. Life is under less stress and has a slower pace, here. We are able to relax with our friends and chat to people. Anxieties and stresses can be talked about and there are many willing listeners - and no dearth of advice! In the west, people are, by and large, without any such outlet, and have to pay fabulous sums to a psychiatrist to listen to them ventilating their grievances. The joint family system, with all its faults, did provide continuity of loving care and security for the children inthe family, even if the parents were absent. Perhaps the care was not too loving where girls were concerned, while the boys were spoilt - but that is another issues. However, even though the joint family is on its way out, even our nuclear families are much more stable than families in the west. Such a social structure does have a great deal to do with the feeling as well as the fact of security. Indian society, again, is far more accepting than societies in the west. Calamities are taken as coming from destiny or God - so are all types of children, including the handicapped and are accepted as such.

This is alright as far as it goes. But more is needed. The community needs to be educated on how to help the handicapped to develop their faculties to the maximum. Not only formal but non-formal education can be given, whether in the school, or the home, or elsewhere in their own locality, perhaps from local or village workers in different trades, preferably in some activity which will make them even partially independent. Such educational experiments are needed here.

With our huge population of over 600 million persons, of which 2 to 3 percent or 12 to 18 million are expected to be mentally handicapped, and 4 per 1000 or 2.4 million severely so, we cannot possibly provide enough special schools for them - or special teachers. The only way to provide education to such numbers is to integrate them into normal schools. The Integrated Education Scheme of the Central Government, has unfortunately hardly been given any publicity. It needs to be taken up by a great many schools. Again, evaluation of such integrated teaching is very necessary operational research.

Even if integration of education were to be widely implemented, we still need to orient and educate the community. Parents should also be given the opportunity to become familiar with modern educational techniques, as they are responsible for continuity of the child's education if he can go to school, and often for this total education, if he cannot. Parents educational-cum-counselling sessions need to be started in large numbers. They are almost non-existent in India at present.

Educational and counselling sessions for parents should stress fundamental principles of education and management of the mentally handicpped such as:

- Education and training should be geared to making the mentally handicapped economically independent, as for as possible, and as early as possible.
- Behaviour modification and conditioning techniques.
- Structuring of educational programme.
- Sequential purposeful teaching. Each step to be repeated as often as necessary till completely learnt, and going on to the next step till a whole skill is mastered.
- Small realistic goals to be set, with much praise and appreciation shown on completion of small tasks, and minimal criticism.
- Occupation to be purposive, not merely to keep a child busy and out of the way.
- No favouritism should be shown among the siblings in a family. Treatment should be impartial.
- Discipline, as well as love and warmth in the home, is essential. Discipline should be consistent and not irregular and erratic. A child must learn to live in society, whether he is handicapped or not. An undisciplined child will not be tolerated by the community.
- Handicapped children should be exposed to the environment just as much as normal children. A child who is hidden away will not be able to learn, and will deteriorate further.
- A handicapped child should not be abused and insulted

with terms such as "fool, mad, idiot, imbecicle". All children, whether handicapped or not, have feelings, and can easily be hurt. Such treatment, besides being hurtful, will also decrease their effective functioning, by making them hostile or withdrawn, and resistant to education.

- A child should be allowed as much independence as is consistent with his safety. He should certainly be allowed choice in matters such as preferences in dress, foods, and activities, as long as there is not too much inconvenience caused to the family. He should also be given increasing responsibility, in the effort to help him towards independence.
- Types of institutions. The adverse effect of residential institutes should be explained.
- Early home stimulation programmes.
- The significance of tests of intelligence.

In addition, individual counselling should be given regarding each child. His whole condition should be fully discussed, stressing his capabilities and potential, not only his disabilities. Such sessions need to be repeated on a regular basis.

With the final aim of independence, vocational training in a variety of trades which are monetarily rewarding, rather than art work along, is needed. So are sheltered workshops and farms, reservation of jobs of the type that the mentally handicapped can do, and contracts for industrial piece goods. Research is needed in evaluation of different types of work and of training, to guide choice of these. At present, vocational training is, by and large,

stereotyped, unimaginative and uniteresting. There is much room for improvement.

Finally, I would like to say a few words on the very important aspect of prevention of this condition. As a result of research here and abroad, we know many of the factors responsible for mental handicap. What is needed is extensive campaigning in education of the community regarding preventible causes of handicap: prevention of consanguinous marriages, adequate supervision of deliveries and adequate antenatal and early postnatal care, early immunization against disease and early treatment of disease, prevention of accidents in the home and on the roads, and prevention of institutionalisation of infants and children to preven them becoming even more handicapped than they originally may have been.

The handicapped can be helped to lead much fuller, happier and more useful lives than most of them do at present, through modern educational techniques. But there is always room for improvement - for better and more effective methods. It is a wide open field for research.

4.03.0 EDUCATION OF THE MENTALLY RETARDED

BY

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INTRODUCTION:

Education of the mentally retarded was not a matter of much interest any where in the world until the early 19th Century. It was a landmark in history of education when Jean Mark Itard undertook to educate Victor, the Wild Boy of Averon in 1801. He tried to give sense training to Victor alongwith the emphasis on the establishment of social, communications and problem-solving skills. But when Itard's attempt to teach this Wild boy was not fully realised, an era of pessimism concerning the mentally retarded inevitably followed. However, in the early 19th century itself Edward Seguin, one of the students of Itard, followed his lead in the prospect of training the mentally retarded. Seguin, in fact, devoted his entire life to develop procedures for working with the mentally retarded within an educational framework. Marie Montessori elaborated on the work of Itard and Seguin in the late 19th Century by developing a programme of activities requiring utilization of all senses.

Since the days of Itard and Seguin almost every country has been actively involved in its attempt to cope with the problem of the mentally retarded including their education, training and rehabilitation in the community.

The concern for the retarded has now become a phenomenon in all civilised nations, and with the industrialisation of the society the necessity of the education and training of the retarded has increased manifold.

Education of the retarded must be understood in its broadest possible context. Education does not limit itself to only academic or mere textbook learning; rather it is more concerned with the all-round development of an individual. The problems of the retarded are varied. Not only they have limited intellectual and learning capacity which makes it all the more difficult for them the handling of symbols in relation to reading, writing and arithmetic, but they are also incapable of having mature social and emotional relationships with peer group or others. He has poor self concepts and lack of self confidence in solving problems or getting alongwith others.

Principle of Normalisation:

An optimistic developmental model of mental retardation views that the retarded is capable of growth, development and learning. The aim of giving education to him would be to help him to develop as a person so that he can manage his own daily personal affairs and regular work and can get a job according to his potentialities, though his psychological abilities dealing with analysis, synthesis, reasoning, recognition, language communication or numerical treatment may never reach the desired level. The aim of education should be considered in relation to the

Integrated Education:

The concept of integrated education is an off-shoot directly emerging from the principle of normalisation. Historically, facilities for mentally retarded were always considered separately from the regular school patterns. However, the recent trend seems to be in the opposite direction.

All types of provisions for services to the handicapped have passed through certain stages of development. Kari Grunewald (1980) has identified such stages of which the first one is the diagnostic stage where diagnoses are made and plans are formulated to meet particular needs. The second stage is that of specialisation where particular needs are met by special solutions specific for those needs. The third one is called the stage of differentiation in which stage it is realized that a particular service cannot be standardized for all recipients. The relevant factors in this respect could be different age groups, degree of retardation and the like. The final stage is a composite one characterised first by decentralization of services, then provision for integration of services to the retarded with those similar services available to the non-handicapped in the community.

The integrated education asks for special classes or schools within the grounds or on the premises of the regular schools with the idea that special education be integrated into general education as fully as possible.

characteristics of the individual concerned. Even the most severely or profoundly retarded is assumed to have some capacity for developing progressively higher levels of skill. This optimistic view point suggests that education and training must be provided to the retarded to promote teaching and development.

The principle of normalization, an outstanding strategy has presently been recognised by all as one of the aims of education. While referring to the principle of normalization Grunewald (1969) states that, "The term implies...... a striving in various ways towards what is normal......normalization does not imply and denial of the retardate's handicap. It involves rather exploiting his other mental and physical capacities so that his handicap become less pronounced.....". Normalization entails "making available to the mentally retarded patterns and conditions of everyday life which are as close as possible to the norms and patterns of the main stream of society" (Nirje, 1969, p. 181). Normalization (thus) is a process that employs as culturally normal means as possible to bring about as normal functioning by the retarded person as possible" (Neisworth & Smith, 1978, P.87). The normalization principles basically involve the principle of humanization. It refers to the services, situations and attitudes which will bring about humane care of the retarded (Dybwad, 1973). It thus implies that the society provides a place for mentally normalisation, therefore, demands availability of services with equal access for retarded citizens so that they can have as normal circumstances and as least restrictive environments as possible.

From the parents point of view, integrated schooling appears to be less stigmatizing. This will also extend an opportunity for the non-retarded children to have some interaction with the handicapped children. Ordinarily prejudice, less compromising attitude, bias and ignorance prevail in most situations discouraging any close relationships between the two. However, under integrated education scheme, the children as well as teachers would become exposed to the retarded which would help them to develop an understanding and tolerance for them.

Till recently education for retarded children in most countries did not form a recognised component of the national or any state plan of the Education Ministry. However, situations are chaning fast and more and more countries are favouring an educational scheme which recognized that exceptional children need to be integrated with so-called normal children in schools in such activities as games, physical education, school assembly, recreation, and hobby activities. They, however, need to be taken out of the regular class for remedial treatment where there is less class pressure and where individual's need can be catered better. In Indonesia, in some rural areas the education of the handicapped children which included the blind, the deaf and the retarded has been integrated with regular schools. Here the special need of the handicapped children is met in part by visiting specially trained teachers who at regular intervals do the suppervisory work to be followed by the regular teacher. The regular teacher thus needs to follow the progress of the child jointly with

the special education teacher by reinforcing the remedial treatment in his class. Adequate use of programmed instructions and instructional games are imperative in this respect.

Government of India has also recommended integration of schools which involves taking in mentally handicapped children in regular schools for normal children, where they would take part in all activities and classes in which they are at par with the other children. It has been recommended that special "resource" teachers and special "resource" classrooms for the handicapped where they can be separately taught in class room subjects in which they cannot participate equally with other normal children.

One of the major objectives of providing a normalized setting for mentally retarded is that they must be maintreamed in the least restrictive environment possible. In the U.S. the concept of integration has been embodied in federal lagislation in 1975 which is deemed to be implented by PL.94-142 - Education for All Handicapped Children Act. The basic intention of this law is to prevent an individual from being stimatized through classification and labelling. The public schools (Govt. Schools) have been entrusted with the education and training to provide appropriate, individually designed, instructional programmes for all children, including moderately retarded, to the maximum extent possible. More and more emphasis is now being given on the provision of instructional programmes for mildly retarded school-age children. This has replaced earlier emphasis on provision of special education programme for the severely and profoundly retarded.

The issue of integration, however, has its usual difficulties as well. For instance, it has often been pointed out that the attitudes of the so-called normal children towards their retarded peers might not be congenial which might lead to rejection or even bullying. Prof. Miki (1980) has also expressed his doubts about the success of integration programme in the field of education for the mentally retarded. According to him the characteristics of the aims and contents for the education for the mentally retarded has been slighted. He argues that the curriculum for the mentally retarded must be made which is conducive to the saving of the limited mental energy of the retarded and the main emphasis would be on teaching minimum essential contents and training an individual according to his abilities which would help him in developing as a person and to get a job in the future. In a recent empirical study, Nalwa and Sen (1979), in fact found that instead of mainstreaming of the retarded, the special schools in a non-institutionalized setting were most beneficial for the retarded. In any case, the integration of retarded children into the regular schools is highly unlikely to be so complete as to include all the severely and profoundly retarded.

Nature of Education and Training:

The usual curriculum provided to mildly and moderately retarded would not be suited to those youngsters with profound or severe retardation who most often need assistance in such basic skills as sitting up, chewing, swallowing or going to the toilet. These developmental areas are of special concern of the special educators who are to decide on type of

curriculum needed, how such curriculum could best be delivered and what would be the facilitating environment most congenial to their need and development of quick training programme for the teachers who would be entrusted with the job of training the children.

However, among the retarded population, only 5% is assumed to be beyond any hope who need custodial care. Nevertheless, India being the second most populous country in the world, its proportionate share of severely or profoundly retarded becomes increasingly alarming. The nature of care and training required for different categories of the retarded, is not the same. The problem is much deep rooted. Even the concept of retardation is not clear to many. The legal provision for the protection of the retarded is far from being satisfactory. The attitude of the public towards the retarded is lamentably unfavourable. The literacy rate is very low in India. Around 80% of the population in India are rural habitants. Many families do not even recognise the presence of a retarded child, unless the problem is a severe one when they try to look for some help from outside agencies. The number of such service agencies is also not large enough to cater to the bulk of the retarded. The existing services for the mentally retarded in India cater for less than one percent of the total number of the retardates.

Early identification and intervention would maximally benefit the mildly retarded. Special education and training may be given to this group following the principle of normalization as far as practicable.

The impact of stimulus deprivation on the development of intellectual and social competence has been widely documented (see Sen, 1976). There is enough evidence that the type of stimuli to which a youngster is exposed during the first six years of life and the extent to which a youngster has opportunities to interact with a changing environment are directly related to the intellectual development of the child in the form of development of complex networks of information. If the child is exposed to an environment comprised of a variety of stimulation, it encourages verbalisation, provides chances for exploration and gives ample opportunities for manipulating objects. Again if the experience is rewarding, the child is expected to develop relatively rich repertoire of information in contrast to a child who has been denied all such stimulations.

The self image of the retarded also needs to be developed. It may be possible to encourage them in expressing their ideas through painting, drawing, clay modelling, sculpure, etc. The Creative Growth Centre in California is doing a wonderful job in this direction. 'Creative Growth' is a community based programme for adults with mental, physical and emotional handicaps in Oakland, California. It provides a supportive, non-competitive art studio environment, counselling, communications and idependent living skills, and also an art gallery to display the work of the handicapped participants. A dedicated husband and wife team, Dr. Elias Katz, a Clinical Psychologist and his wife Mrs. Florence-Ludens Katz, an art director, started the centre in 1973 with a grant from the office of Human Development of the U.S., Department of Health, Education and Welfare.

It is a unique programme dedicated to the idea that all individuals, no matter how severely handicapped (mentally, physically or emotionally) can gain employment, enjoyment and fulfilment through painting, sculpture, print making, and can also produce works of high artistic merit. It cherishes to the conviction that all people including those with physical, mental, and emotional handicaps, - have the capacity to grow and develop as happier, more productive human beings through creative art experiences. The programme is geared to individual needs and many exceptions are made so that the handicapped can grow at their own pace in their own direction. The individual gain self esteem while improving communication and social skills, part of the overall development of one's potential for independent living. Counselling and independent living skills are also integrated into the programme of the 'Creative Growth'.

In India, three artists from Jyothisangh, Ahmedabad had won in 1979 international distinction for their works of art which were selected for exhibition at the prestigious 17th International Exhibition of Art by the Mentally Handicapped held in London.

The moderately retarded needs special educational programme which should aim at development in major learning areas. In addition to basic education in 3 R'S training in self care skill needs to be given. This should include major developing areas like motor integration, perceptual and motor skills, language and communication and conceptual skills. Special curricula may be developed and standardized for this purpose.

The retardates may be given special training leading to practical help in their day to day life, such as dressing, independent movement, handling of money matters, maintaining personal hygiene, learning to communicate about their needs, self-help, etc.

Creation of more service centres and day care centres leading to development and training of the moderately and severely retarded is needed. Day care centre has been looked upon as a modal form of care in most of the countries as has been noted in the WHO workshop of the South East Asia Region held in New Delhi between 12-16 Sept., 1978 for the 'development and strengthening of mental retardation programmes. It is less complicated to institute and less costly to maintain the desired level of care, and at the sometime it preserves family ties. The consensus of the workshop emerged to emphasize day care as the more generally applicable setting for retarded children of school going age. Grunewald (1980) also commented that "an influence for favourable development is to be found partly in the small number of interpersonal relations forced upon the retardate thus making them potentially stimulating rather than frustrating, and partly in the homelike atmosphere and equipment of the room and of the unit to which the room is connected." (Grunewald, 1980: P.66).

Creation of small, parent-initiated facility in diversified forms for the retarded children outside the mainstreams of professional educators, and administrators, has received impetus in recent years. The advantage of

adopting the principle of "small environment" for the severely retarded where the number of persons for interaction is limited to a group of 5 to 8 or even less has been outlined by Grunewald (1980). It has emphasized a caring atmosphere, and day facilities that preserve the ties with families.

The significance of early education programme and the nature of pre-schooling programming has been detailed by Neishworth and Smith (1978). In the Indian context Malhotra (1979) has also suggested some development of educational programmes including home-stimulation programme for the retarded. In a bid to deal with the practical aspects of MR, FWMR (India) also recently gave a call for Essays for competition entry leading to practical programme concerning curriculum/training schedules for the mentally handicapped. A number of such essays (Ahear, 1979: Radhakrishnan, 1979: Shamim, 1979) have shown sufficient merit which deserves consideration for a follow-up.

The profoundly retarded who need custodial care constitute only a small portion of the retarded. More institutions may be started in all states to look after such cases. Adequate trained personnel may be employed in such institutes. The families who cannot bear the life long burden of the profoudly retarded children, emotionally and/or financially, need to be helped by the state. This situation may occur to any type of family background, irrespective of race or creed. If the families can afford, they should pay for the care of their wards in the institutions according to their income, in case they are not willing to keep such cases at home

along with them. Conversely, if some family wants to keep such children at home, but cannot afford it, they should be given help from the state.

Vocational Training of the Retarded:

Academic achievements are relatively unimportant in comparison to social adaptation and vocational training of the mentally retarded. Vocational training is the only means of making mentally retarded economically and socially self-dependent, at least partially. A civilized society is keen to see that even its most humble member, with severe shortcomings, be it physicall or mental, finds a place in it though in a meagre way, without unduly living a parasitic life. In this context scientific enquiry is of utmost importance to tap the abilities and limitations of those less fortunate inhabitants. So far as the mentally retarded is concerned, there is also a growing consciousness in recent years that at least some of them can achieve a reasonable degree of adjustment to work and social life. This conviction is receiving impetus from research findings all over the world. The last few decades have witnessed various efforts made by investigators in different countries for evaluating and predicting the potential of the retardate for vocational rehabilitation.

Vocational schools for the mentally retarded adults are not too many in India, as a result many of them do not find suitable jobs even after education and training in special schools. The sheltered workshop is the ideal for employment of the trained mentally retarded. A Sheltered workshop serves as a transitory place for mild and moderately

retarded to receive training in various trades and crafts, to develop more skills and provide opportunities to get jobs in the open employment. The training is provided in sheltered atmosphere. Structured work problems which vary in complexity can be created to develop his work capacity. Sudden transition to work environment is not easy; on-the-job training and sheltered workshop are necessary to protect him from the stresses of competitive more situtations. For mentally handicapped adults sheltered workshops, farms and employment by industries are needed. For severely retardates and many moderately retarded, who are not capable of receiving open employment, sheltered workshop is the only answer for employing them permanently. After receiving training they work on various subcontract works received from various agencies.

The process of job identification is not so easy when planning for the employment of the mentally retarded worker. Jacobs et al. (1979) have given a source of general information on appropriate jobs which is designed to help the counsellor locate these jobs and employers within the community. The 158 job profiles are arranged in 6 related groups: (1) merchandizing occupation, (2) office occupations, (3) service occupations, (4) agricul fishing/foresting, (5) skilled trades, and (6) processing and manufacturing occupations.

Training can be given both for vocational and pre-vocational phases of a training programme. Different types of training programme may be conducted in a variety of combinations and settings. Training could be in basic skills which refers to the preparation of the trainee in the fundamental and academic skills such as reading, writing

opportunities for personal growth and community placement. There are now 160 non-profit autonomous members of goodwill industries of America, Inc. which constitute the nation's largest private rehabilitation programme serving 60 per cent of American vocationally handicapped persons. William C Wiegers, the executive director of the industries of the Greater East Bay says that, "No matter what abilities a person has lost, other abilities remain. The first big step in new hope to a handicapped person is to find that he can do best....... it is a living faith, for by it we mean service, team work and a genuine belief in our individual responsibility toward our fellow men, convinced that the true object of all help is to make help unnecessary". Goodwill trains persons with mental, physical or social disability, for jobs that they can do such as warehousemen, food services, sewing, drycleaning and laundry, upholstery, woodwork, small wares repair and bicycle repair. The training in a specific field is provided in accordance with the trainee's own efficiency and employment potential. The training is also geared to specific openings' demand for unskilled or semi-skilled, as available in the communities' placement market.

Today, Goodwill is international in scope with the active support of people of many faiths. There are many Goodwills throughout the U.S.A., Canada and other nations. East local unit operates independently relying on its own community to formulate and execute its programme. Their venture has been well paid off, as the commodities they sell, are procured from different families free of cost who

and typing that are applicable to almost all jobs. The second is training in care skills providing the trainee with experience of more complex activities, common to a particular group or general groups of jobs. The third type relates to the preparation in specific skills required by the trainee in which he is to be placed. Finally, the work adjustment training that pervades all aspects of training and is concerned with motivation, work attitudes, work habits and productivity.

In a recent work Sen (1981) has reported the findings of an empirical study dealing with appropriate manipulation of certain variables which would have a beneficial effect in bringing into the universal transfer phenomenon among the retarded including moderately and even a few severely retarded.

Vocational training and education of the retarded should train them for independent living as far as possible. Work may be given to them with financial recompense. The staffing pattern and the training of the staff employed should be given due attention.

Sheltered workshops may be started in different parts of the country to absorb the mildly retarded and even some moderately retarded who can prove their worth under proper training and care.

The goodwill industries in some western and eastern countries mainly employ the retarded. These industries were first organised in Boston in serving the disabled, vocationally handicapped and vocationally disadvantaged by providing vocational rehabilitation services, training

want to dispose of their old belongings, used or unused. The donors in exchange get substantial benefit in terms of tax exemption due to their charitable gift. The scheme is working well, the consumer gets the product at a very low price in contrast to market price and all the parties involved are equally benefited from such endeavours. Though it is not sure whether such a scheme would also work with such efficiency in India, the project is, however, worth trying.

Residential Facilities for the Retarded:

The retarded adults should be absorbed into the community as far as possible. they may live satisfactory functional lives with their families. However, they may also live in small residential groups.

In the developed countries, there are ample resources to have elaborate schemes for the welfare of the retarded. The system suits the specific culture and demand as neither the families have time nor have the will to continue with the retarded children. States' help is readily available, and whenever the families can afford, they pay for their wards after sending them to some retarded home and institutes. The 'Clausen House' in California, provides a residential house for the retarded which gives them practical training as well as pre-vocational training. The Clausen House is a series of residential facilities for mentally retarded adults operated by a non-sectarian, non-profit corporation under the sponsorship of the Episcopal Diocese of California.

It provides active programming through-out the week in a residential setting which includes elaborate instructions in the basic skills of independent adult living and additional training in living skills. Recreational activities are also included in the programme to enhance the residents' abilities to plan and structure leisure time. The special project GOAL(greater opportunities for adult living) is an apartment facility which provides a semi-independent living situation for those Clausen House residents who are ready for an intensive, individualised programme in independent living.

The retardates should have a chance if they so desires of independent living and working, away from their own family. However, the issue of residential facilities of the retarded need to be worked out individually for each society and culture. In Indian context, it seems that whenever possible the fmaily may be encouraged to look after their own retarded off-spring (irrespective of degree of retardration) for which the family may be provided financial assistance, particularly when the retarded child is not gainfully employed in a sheltered work-shop or in an open industry.

In India, the retarded child as far as possible is to be looked after by the family. The failure of institution-alization programme and state hospitals in the west should point out the correct perspective in the Indian setting. The family bond is strong enough in India, the child should be absorbed in the family as far as practicable. The concept of mother teacher needs to be given proper consideration. If the mother devotes time for the retarded

child in a natural environment, all encouragements and material incentives should be provided to the family. The state may give some financial assistance to the family. Some weekly classes for the parents of the retarded may be organised in different localities which would enable them to be acquainted with the probable solutions for various problems faced by them as also they would be able to interchange their ideas and views regarding the problems of their off-spring with the fellow parents.

The residential facilities may be provided for these retarded whose home environment is not a congenial one or whose condition is so profound as to demand a cot care which the family cannot afford.

Proper legal provisions need to be made for the protection of the retarded against exploitation and their uncunning involvement in some low related problems (see Sen, 1978). Co-ordination of professionals concerned with the problems of the retarded may be effected in the form of periodic organised meeting at different locations. Need for public awareness about the problem of retradation and development of the correct attitude towards the retarded is another prerequisite.

Training of the Personnel:

Any programme in the services in the field of retardation calls for co-ordinated efforts in the mobilisation of all possible avenues in an attempt to ameliorate the condition of the handicapped and to rehabilitate him into the community. Needless to mention that Government both at centre and state levels, local

authorities, voluntary agencies and public at large should work concertedly in this direction.

The very nature of the problem of retardation involves persons of different professions with diversified background in training and education. Adequate training and education of all personnel involved with the care of retarded is of primary importance. Medical practitioners, specialists, psychologists, teachers, social workers, technicians, all should receive a good background in the subject of retardation.

The task of training the personnel is not a simple one. However, the most valuable resource for the retarded is his teachers and staff. It is, therefore, of utmost importance that staff would be properly trained. Therefore, special emphasis should be laid on training of teachers of the handicapped leading to a comprehensive understanding of the condition as well as acquirance of knowledge about modern techniques of education, training and management.

Training programme would also involve training of personnel for residential institutions and day care centres. where children would have mostly profound and severe retardation, Special education teachers, teacher helpers, crafts teachers, administrators for retardation centres are the pre-requisites for education and training of the moderately and mildly retarded. Similarly trained personnel is also needed for imparting pre-vocational and vocational training of the retarded.

Training of the parents is another important concept. The emphasis on parental involvement in the education of their handicapped children has received ever increasing impetus over the last decade. The rationale for parental involvement and in consequence their training, has been expanded by Prof. Peter Mittler in a lecture organised by the FWMR in 1979 during his visit in Delhi that time (see also Mittler, 1980). It is of utmost importance that parents, particularly mothers should receive adequate guidance for promoting physical and mental development of the retarded off-spring. They also need counselling in their own psychological adjustment towards acceptance of the very hard truth that the child is handicapped. Guidance to parents and their involvement particularly in the pre-school training of the child is of utmost significance. In fact, the whole family of the retarded is in need of help both economical and psychological. The attitude of the siblings, the relatives residing under the same roof have to be moulded so that proper development of the abilities and capabilities, howsoever might be restricted, can be ensured.

Concluding Remarks:

Though the exact number of retarded is not definitely known, it has been estimated that there might be about 24 million retarded in India(see Sen, 1981). Prabhu (1979) has indicated that taking the average Indian family size 5-6, one out of every 8 to 10 families is directly connected with the problem of mental retardation.

Though a majority of them would be only mildly or

moderately retarded. However, in Delhi itself about 2000 cases are diagnosed as retarded every year. The existing facilities absorb about 100 of them. To date, there are about 150 known institutions in the whole country providing 8000 beds for a population of 24 million retarded people. The institutions provide clinical medical, educational, vocational, pre-vocational, teacher-training, research, psychotherapy and care. Of these, educational and vocational programmes are more common and psychotherapy is the least. The services which are now available are primarily concentrated in major metropolises, but many states and cities do not have any facilities at all. Most of the institutions are either run exclusively privately or privately with some aid from the state/central government.

The facilities available for habilitation of the retarded are far from satisfactory. Adult retardates have received the least attention so far in India, and facilities for them are relatively few throughout the country. Neither the private organisations nor the state authorities have dealt sufficiently with the problem of mentally retarded adults. In recent years, however, attempts are being made in many parts of the country to devote some attention to them.

The problem of the retarded in the villages is not the same as it is experienced in the cities. In the villages as also sometimes in cities many are ignorant about the concept of mental retardation. When the child

is unable to continue at school, he is automatically absorbed in the family trade. However, in many cases, their handicap would be conspicuous if they are transferred from a rural set-up to an urban one.

In the cities, when the mentally handicapped child cannot continue at school, he poses a serious problem for the family as also for the community at large. Industrialisation-cum-urbanisation brings in more plight for the retarded in terms of their adjustment to the community.

However, an awareness of the nature and problem of mentally retarded has been growing in India over the last two decades. The unholy trinity of illiteracy, malnutrition and poverty contribute to disadvantages in the intellectual and social development of the growing child. Poverty also forces the off-spring of the poor to have very limited sphere of experiences. Because of the complex nature of the Indian social structure it is reasonable to assume that it would be much more difficult to eradicate completely some of the social evils like poverty, cateism, rural-urban discrepancy in facilities, prejudice and discrimination, poor nutrition, inadequate health services, substandard housing, inferior education, unemployment etc. However, with the gradual elimination of social inequalities and moulding of attitude it might be possible to develop the right perspective. And even though it would not be possible to reduce the prevalence rate of mild retardation by way of complete removal of environmental deprivation, creation of better scope for

their care, training and rehabilitation would go a long way in ameliorating the conditions of this group and this is the need of the present time.

Mental retardation is not just a medical problem, it is basically a social problem. It is a challenge for any of the interdisciplinary sciences having direct or indirect concern for mental retardation. Amelioration programme involving welfare measures - education, social and rehabilitation would be the correct perspective for modifying an existing or developing effect.

It is heartening to note that in the recent past the behavioural scientists in India also have shown their concern for far reaching consequences of multifarious aspects of retardation. One manifestation of their concern has been in the form of organising seminars, symposia and conferences in different parts of the country. The Golden Jubilee Conference of the Indian Psychological Association on "the Disadvantaged Child" (University of Madras, October, 1976) has made specific recommendations for providing extra facilities which are meant to compensate for the improvised environment of the children. The year 1979 International Year of the Child has also seen a number of activities concerning welfare of the child in India. In order to develop a policy and a plan of action at the national level a draft of recommendations was prepared by Indian experts at the initiative of Director General of Health Services and the Ministry of Social Welfare, Government of India. The current year 1981 has been declared as the year of the disabled and a number of conferences at different levels are being organised

as one of the main activities concerning the handicapped. Implementation of some important recommendations would go a long way for an overall development and learning of the retarded.

Though sufficient literature is now available concerning the assets and deficits of the retarded, more research is necessary in the educational field in the Indian context. An action oriented programme is awaited alongside with the need for research.

Some of the Important Areas of Research for Education and Training of the Retarded are:

(1) Determining the prevalence of mentally retarded including rural areas and identification of mentally retarded in its different categories.

(2) Development of intelligence test with particular reference to non-school going children who might have different cognitive styles from those having school experience which are usually subtly imbedded in the so-called intelligence tests.

(3) Development/adaptation of social adaptability scale.

(4) Role of stimulating environment on learning and other cognitive developments.

(5) Role of mother/parents in the education of the child.

(6) Factors affecting learning and remedial measures.

(7) Education and training during pre-school years (upto 6 yrs.) Determination of the nature of pre-school experience necessary to be given.

(8) Scope of special education (16-18 yrs.) integrated education for mildly and moderately retarded. Scope of mainstreaming. Areas of adjustment and maladjustment.

(9) Impact of small group, day care centres for the severely retarded.

(10) Scope of Training and rehabilitation of the adult retarded. Training the mildly and moderately retarded adult in pre-vocational and vocational skills. Factors affecting such training and consequent vocational adjustment and rehabilitation in the community.

(11) Education of the personnel who are directly or indirectly concerned with the welfare of the retarded.

May be by the turn of this century we would be able to produce an optimistic picture about the conditions of the retarded in India even with the limited resources available in our country, provided we can have a co-ordinated effort in the mobilisation of all possible facilities for the retarded. The most logical way of amelioration of the condition of the handicapped would be by means of a commulative programme both bio-medical and social, for individual development from conception onwards in conjunction with the parental education and mobilisation of environmental facilities. This would involve formulation and implementation of appropriate policies for an all round welfare of the handicapped in different parts of the world.

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4.02.0 Lead paper

LEARNING DISABILITIES
(SPECIFIC READING DISABILITIES)

BY

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Going found a magnificient museum in koln (Cologne) West Germany, seeing slides with historical reviews in German language, and hearing commentaries, I came out with utter frustration. I was like an illiterate person, disgusted with the affairs around. I had the feelings of a child with reading disability. In the modern literate world every move is directed and geared by the printed word. What must, this apparently normal, bright and lively child, be thinking? Consider the plight of this 'way-sider' in Crosby's words. (1) In our rush for education and learning to read, this "way sider" tumble's down, and waits for some one to notice, recognise and provide help.

Eisenberg's effective expression " a handicap in reading is a crippling disorder in a society that is increasingly dependent upon literacy", (2) sums up a hard fact that blocking of the avenue of written word, closes the treasures of literature and makes it difficult to earn a living or make adequate social contacts.

The superiority of human race lies in the innate neurological ability of man to communicate, and reading is but a wider extension of communication skills. Reading is the function of the brain. It is an elementary neurological process in a direct continuum of other developmental processes like sitting, walking, running, [illegible],

talking etc., which develop before the school- going age. Reading, writing, and arithmetic are cortical functions developing at school age needing the stimulating help of the teacher. They also depend upon the ability of the child to form automatic and permanent associations between what he hears, says, sees and writes. If the child is unable to make such lasting association, he faces failure. Dysfunction of some cortical area leads to dyslexia, inability to read or its related disability dysgraphia, inability to write, or dyschalculia, inability to do arithmetic.

The majority of children learn to read with an astonishing ease and make us forget that reading is a "complex network" or cognitive processes. It requires the child to use visual, auditory and motor skills to recognise words and symbols to associate them with sounds, interpretting previous experiences to give meaning to these sounds. Gradually he supplements the sight and sound approach by sequence, structure and sense.

Extensive surveys in Britain and the United States, leave us with the uncomfortable feeling that more and more reading casualities are taking place in the community. According to the figures quoted in 1960 by the Dyslexia Memorial Institute, associated with the Wesley Hospital, Chicago, about 30% of the pupils in grades IV,V & VI show that they do not have sufficient reading proficiency to handle the programme of typical American Elementary School. (3) Dr. James Bryant Conaut, former President of Harvard University, states that after carrying out a survey of American Secondary Education, under the auspices of the Carnegie Foundation, he has come to the conclusion that 40% of the pupils in the 1st, 2nd and 3rd years of American

High Schools are reading at the sixth grade level or less (3). Margaret Newton in her paper reported that it is estimated that 10% of school children in Britain have the linguistic coding difficulty (4) Rabinovitch (1968) cautiously put the reading backwardness at 3% while some American authorities regard it as high as 10% of the total school population. The most recent survey report, master-mined by Sir Allen Bullock says that literacy standards of school leavees are not satisfying present- day requirements. It also reveals that in an assessment of the reading ability of 12 years olds, more than 22% were 'below average' (5) One wonders at this incidence of reading- failure going up. There are several reasons. Some children fail to read because they don't have the intellectual capacity to read, others fail because they grow up in a culturally impoverished environment. There may be some who emotiona-lly upset because of traumatic home or school condition that their concentration to work might cheat them. Still another group might lag because of inadequate teaching teachniques. Then, there is the group who may have difficulty in learning to read despite conventional instruction, adequate intelligence and socio-cultural opportunities, and proper teaching techniques. This is the vulnerable group which runs the risk of remaining illiterate unless helped by an understanding teacher who uses proper teaching methods.

In 1877, a German physician, Kussmaul, invented the term 'word blindness' and called attention to patient who was unable to read although his vision, intellect and speech were unimpaired (7) several professional papers

emerged after Hinshelwood's book on 'Congenital Word Blindness' but the clinical information gathered from these papers, was not usable by the average class teacher or those most vitally concerned: the parents.

Burt's emphasis on environmental and psychogenic factors came after his investigations into backwardness and led to a temorary loss of interest in congenital- word blindness. The interest revived with T.S. Orton, an American psychiatrist and Neurologist in 1925 (IO) and led to the formation of 'The Orton Society' - a major professional force in U.S.A.

What had been once a medical field was taken on by sociologists and educational psychologists, Augusta Brunner (1917) emphasised the complexity of reading processes (6) Burt (1937) and Schonell (1948) in Britain described the precipitating factors of reading disability together with with diagnostic and remedial techniques. Gates (1922) in America analysed the skills and perceptional abilities underlying the process of reading and developed tests of reading readiness.

The historical background of reading disability and its etiology outlined under the theories of 'genetic factors', 'maturational lag', 'neurological dysfunction' and 'cerebral dominance' and not mutually exclusive. There is almost always an overlap between one causative factor and another. Reading disability occurs at all levels of intelligence and may be aggravated even if not caused by environmental factors and emotional maladjustments.

Writers agree that in developmental reading disability, boys outnumber girls. (Ratios range from I:4 to I:IO)

This might be due to social reasons as a boy, backward in learning to read causes more parental concern, then a girl facing the same problem but there may very well be a genetic factor underlying its occurance.

M. Critchley (6) reports that reading disability also occurs when language is strictly phonetic, such as in Germany, Spain, Italy, Holland and Greece. It would occur in China and India also though the exact pattern of defect has not been identified. In 1961, a Japanese neuropsychiatrist, reported the case of a 12 year old boy with reading disability. A pediatric neurologist, Dr. K.K. Sachdeva, (All India Institute of Medical Sciences, 1975) reported of the incidence of specific learning disability as a cause of school failure in 89% of the sample from upper and middle income groups.

BEHAVIORAL SYMPTOMS ASSOCIATED WITH READING DISABILITIES.

Etiology is the field of neurologists and medicalmen while the educationist is more concerned with the behavioral manifestation of the disabled child. How does he behave? What makes him different?

Specific Reading Disability occurs with a variety of sensory and behavioral deficits. To reduce the beterogenity of Sympatoms, Benton classified the disorder into two major types. "Parietal" occuring because of lesions in the parietal lobe and is associated with severe dysgraphia. "Occipital" arising out of lesions in the parieto-occipital area of the dominant hemisphere and reading is facilitated by kinesthetic clues and tracing methods (2).

Whether hemispheric dominance is a cause or an effect is a question still to be answered. Orton (1937) first remarked "defects in the development of the language

function may arise from a deviation in the process of establishing unilateral brain superiority" (10) And eversince this has been a discussion point among educators.

According to Crosby "disordered dominance is not a cause of neurological reading disorder, but an effect of the same neurological process that caused the reading disability".

Reading disability may be associated with visual and auditory preceptnal problems. Visual imperceptions appear in conjunction with one or several of the following symptoms such as impaired tactile percemption, faulty auditory perception, dysgraphia, dyscalculia aphasia and other language disorders, poor motor coordination, improper sense of direction and body image.

Visual imperception associated with reading disability range from severe to minimal. The child may have difficulty in differentiating letters in alphabet. He makes "crazy" errors in spellings, "guesses" and "fudges" while reading aloud. The look-say method is a disaster for him. He needs phonics and tactile perception through writing. He has special problems with letters which are rotations and reversals e.g. bd; pq; MW;. He may also reverse the order of letters e.g. dog for god; tar for rat etc. The normal child also makes these errors but he soon grows out of them and quantitatively makes less of them. Bender Gestalt is a useful and simple way of delecting this type of disability.

Tactile imperception along with visual imperception may also appear in reading disability. On its own tactile imperception does not present a problem in learning but knowing about it givens a clue to teaching as

he will not benefit from tactile techniques pioneered by Fernald. He must be taught phonically.

Some times reading disability appears in conjunction with dysgraphia and visual imperception. In that case the child shows faulty spellings, erratic formation of individual letters, as well as poor penmanship. Correcting the visual imperception must be done through drill in discriminating one letter from another i.e. intensive use of phonics and kinesthetic method, if no tactile imperception is present. Dysgraphia is difficult to correct. It might improve as usually perception improves with maturation. However, there should be less emphasis on writing and mechanical aids like typewriter might ease the child's problem.

Perceptual problems are frequently associated with motor problems, and they do at times show up with reading disability. Severed motor dysfunctions appearing in Cerebral Palsy, Polio, Multiple Sclerosis are quite obvious. Minor motor dysfunctions, though cause problems for the patient are not obvious for the laymen. It may manifest by difficulty in doing repetitive motions, performing independnent tasks with each hand, following movements that involve a pattern and a generalised poor coordination. Crosby (I) describes several ways of testing for these neurological motor difficulties of patterned movements "mirrormotion" and motor praxis. The diagnosis of these is helpful in bringing an understanding and sympathetic approach to the forgetful, distracted, disorganised, haphazard and 'clumsy' child.

On the other hand, Auditory perceptnal problem, although less common fortunately, is the most difficult to

tackle. Auditory imperception makes it difficult for the child to even approach the task of learning to read as he hears the sounds in-correctly and speaks them incorrectly too. For diagnosing, "Wepman Test" is used in which the child picks out words by the different sounds they make and by listening carefully one can identify the sounds the child hears incorrectly. The child will best learn through visual and kinesthetic means and this is the one neurologically impaired child for whom the look say method is a boon.

According to Critchley, the "socalled" "soft" "neurological signs are more likely to be demonstrable in younger agegroups, for as the children grow older they tend to loose their disabilities". (6) The neuroligists report that a child carrying out an intricate movement with his fingers and hand on one side, automatically performs faint phantom mirror opposite movements with the other. This phenomenon of "Synkinesia", as they call it, can be observed crudly by hand-grasp test. If the child squeezes the fingers of another persons hand tightly, the other hand also automatically, flexes. Some younger children show difficulty in the performance of spatio - constructional tasks, including jig saw puzzles and kohs' blocks.

Each child is unique- he may have a simple disorder unaccompanied by other neurological difficulties or he may have a complex array of neuroligical peculiarities. He may have no demonstrable perceptual or motor difficulties, yet still have problems. The multifacted nature of reading disability is its greates challenge to parents, educators and physicians.

IDENTIFICATION AND DIAGNOSES

In neurological circles, the team Dydexia is well understood, but in educational circles, after the Tizard Report, it is referred to, as a kind of Reading Disability. Diagnosis without remedial action is useless no doubt, but how can remedial action be taken without uniquely indentifying the exact handicap?

It is of paramoont importance to indentify at an early age shy a child is failing to learn to read, as the failure to recognise, causes anxiety, frustration, depression and unavoidable misery. The question arises how early reading disability can be indentified? De Hirsh, jansky and Langford (1969) and Meleod (1969) report that it is possible to fore cast, when children first go to school, those likely to find reading difficult. Francis williams study (1970) of pre- school children shows that it is possible to pick out before children go to school, those with specific learning difficulties. Effective screening should be carried out during the first year of school by teachers, and doctors. This certainly requires the construction of a battery of tests which teachers should be trained to give. Medical case history should include history of speech and motor development, child's articulation, language and motor-coordination. Cases of uneven development could be presented for complete neurological and psychological investigation. Sandhya Naidoo supports the idea that teachers should be aware of the "out of step" development of children, should be able to recognise those " at risk" and provide understanding and support for their emotional well-being (12) Margaret Newton

working on a similar idea said " its the teacher in the calssroom who needs the ability to diagnose children who are going to have language difficulty" (13) and put into the hands of teachers all over Britain towards the end of 1975, after validating its statistically -- the Aston Index-- a tool to pick up school children " at risk" in learning to read, as early as they begin school and later at seven.

The Aston Index is an integrated approach providing the teacher with a profile of each child and includes some original tests to find out the general underlying ability in terms of picture recognition, vocabulary and recall as well as his visual sequential memory, his recognition and recall of digits, and his sound discrimination and sound blending. Margaret Newton hopes that teachers while talking to parents will discover any family history of laterality or reading and writing problem. Laterality is the "keyword" according to her, who believes confusion or inconsistency in lateralisation is a significant tactor in many children who have reading problems. The Aston Index consists of three parts, Form I, Form II and Form III. The first two are divided into three areas (Appendix - B).

Earlier attempts at identification of reading disability consist of various Batteries of tests and Checklists described by different writers at different times. Dale R. Jordon (14) talks about three " faces" of dyslexia that is visual Dyslexia, Auditory Dyslexia and Dysgraphia and presents a comprehensive checklist for each kind of dyslexia for the teacher.

Careth Ellingson (ii) talks about the strengths, weaknesses and handicaps of a child as "triangle of" his learning potential". "This triangle of learning potential may be thought of as a child's prescription for learning - the prescription blank is written by testing and diagnosis- the prescription is filled by out teachers". She describes a checklist with items mainly from Paterson- Quay- Werry- Weiss Peters Scales which can be easily scored by teachers and parents (Appendix C). Some of the essential standardised tests in addition to the checklists suggested by her are WISC & WPPSI Marianne Frostig, Bender Gestalt, Detroid Tests of learning Aptitudes, Eisenson's examining for Aphasia, the wide Range Achievement Tests, Wepman Test of Auditory Discrimination, Goodenough- Harris Drawing Test - and several others.

Sandhya Naidoo (4) stressing the need of early identification to "avoid years of frustration" describes the assessment procedures to consist of teacher's day to day records of sensory functions, motor functions, behavioral problems and psychological evaluations consisting of intelligence Tests (individual and group), reading and spelling Tests, Tests of speech and language, Visuo-perceptual functions, Laterality and Right/ Left confusion.

It is an established fact that psychological Tests have their limitations and there is not a single perfect flawless testing instrument. So, until a perfect diagnostic instrument is devised we must be content with what we have and make the most of it. However, there is a growing awareness about the coordination of the various disciplines of neurology, psychology, and education to join hands in the diagnosis and identification of Reading disabilities.

I would like another pair of hands to be joined in and that is of the parents.

TEACHING TECHNIQUES

An article by Dr. Smith, 'Trends in Beginning Reading since 1900' gives a historical account of approaches to reading in U.S.A. She states that by 1900, the alphabet approach to reading had disappeared and the phonic approach started in 1890, was in full swing. The appreciation of reading with comprehension gradually scorned the 'juggling with meaningless phonic elements' and phonics was practically abandoned. The pendulam swung to the other extreme of an exaggerated emphasis on silent reading for meaning. The Activity- movement came in by 1920 and by 1940, systematised reading programmes and the use of basal readers was in vogue. The 'new' phonic method with word attack approach, television method, programmed instruction, linguistic approach, the individualised plan, the Augmented Roman Alphabet, were rather old wines in new bottles,

Horrace Mann's whole-word or look say method was fully developed by the middle of the 19th century, which regarded phonics as boring, frustrating, and confusing for the child. The phonic-advocates on the other hand condemned the slow and time-consuming element of look-say method. However, the two extremes have sought an accomodation and the goal today is an amalgamation of both methods. This combination in class room situation is applied in three ways - the Basal Reading Programme, the language Experience Approach and the Individualised Approach.

Walcutt blamed the various analytic 'look-and-say', 'flash', 'see-and say', global systems of teaching, which

concentrate upon the earl identificatio of a word with its meaning, rather than its sound, for producing more reading problems. And several others agreed with him. In 1960, the San Francisco Curriculum Survey Committee made recommendations under the heading 'Reading: the Basic importance of phonics' and suggested that phonic or syllabic (but not alphabetic) techniques, possessed certain merits for the poor reader, although they were not in keeping with the Gestalt principles of learning. It is not fair to say that a particular method can cause reading disability. In 1937, Orton reported three times more reading problems in children taught by look-and say method (I). Munroe also advocated the old fashioned phonic approach.

Bender believed that there is danger in starting children to learn to read too early. She gave the example of Sweden, where there is relatively low incidence of reading disability and the children first attend School at 7 years. Connected with the problem of when to start schooling, developed the concept of 'reading readiness' and several Reading-readiness-Charts'. But they do not improve reading disability, except by bringing about early diagnosis.

Attempts have been made recently to counteract the illogical, spellings of the English language too. Bernard Shaw's extended alphabet, pitman's Augmented Roman (A.R.) also known as the 'Initial-Teaching Alphabet' (I.T.A.) with 44 characters, Lyn Wendon's Pictogram System are the outcome of such efforts.

The fact remains that educational research aimed at improving methods has not eradicated the hard core of the problem- reader.

Though there is a wealth of clinical knowledge about Reading disability, we do not have appropriate school programmes or public awareness as to how to teach these children. Today, a deaf or blind child can more readily receive a well-sounded education then a child with reading problem, because their problems are easily recognised and widely understood.

T.R. Miles(16) suggests the sort of information to be given to the parents, so that they can actively participate in the amelioration of their child's reading problems. Suggesting guidelines to teachers and stressing the importance of trial and error and flexibility of approach, he puts forth the system of "Building up a dictionary" and "phonetic - cue-method". He found success by giving practice in writing series of phonetically systematic words to give confidence and understanding of irregular English words.

Ellnrgson appropriately sums up the rationable behind these methods 'Most Clinical methods" for teaching the slow leaver "are ligical step-by-step progressions which help build neural pathways within the child" (ii). The earlier the slow child receives the remedial help, the easier it is for teacher and child. Ellingson also stresses the importance of patience and time and describes the pre-reading skills which should be taught before starting teaching to read and the multi-sensorial approach for associating letters and sounds.

G.L. Sceats teaching a 10 years old no-reader, Arther in Newzealand, found great success with "the Scott Programmed Reading kit" and suggested to raise the child's mind to a conscious logically reassured level.(18)

Talking about "Remedial Re-Education", Sandhya Naidoo (4) advises a programme devised on through understanding of the child, as to where he experiences particular difficulty, knowledge of his strengths and weaknesses, positive motivation, teacher pupil relationship, individual instruction and success- experiences.

Gill C. Cotterel (4) gave three lectures on the teaching procedures and advocated (Edith Norric letter - Case-System) and Fernald. Auditory - Kinesthetic method for auditory dyslexics; and junior phonic - Rummy game, simple spelling rules, language training, mechanical aids like typewriters and a systematic approach to basic sounds through a check list, for visual dyslexics.

In the Rehab Report (19) a parent gives a useful suggestion about "name-the-shape" alphabet and " family of letter" devised by her for her child.

Margaret Newton and Michael Thomson (suggests an underlying philosopy of "PERCEPTUAL ANCHORS". They profess " a system of rules, orders and regularities which can be reinf- ed by concrete m. iational strategies and relevant mnemonics" The teaching environment according to them, should suit individual needs and has to be motivating.

In an appeal to parents and teachers Crosby suggests three A's acceptance, approval and affection (i) In planning a curriculam for slow learners he suggests to limit regarding, in primary stages, to a handful of words essential for their safety e.g danger, fire, stop, go, poison etc and address. After ten or twelve years begin intensive regarding instruction. It appears to be a sound suggestion because at this stage some of the perceptual problems would have improved or disappeared and he could be taught with greater speed, much less effort and exasperation.

No one single teaching method works in isolation what is needed is "the skillful lending of a variety of methods". Infact, I quite agree with Ortons's saying "anything that will work is a good method" and more than method is the " quality of the teacher" that is important. One does not expect miracles, but the "bond" tween the teacher and the taught is an essential prerequisite to any improvement.

Great attention should be given to emotional consider-ation. The child needs to understand his difficulty that he will always read slowly and more work will be expected of him. Similar understanding from his teachers permission to read any way he can, by context, pictures, thumhprints on the page, just so long as he obtains the meaning. Less emphasis should be placed on oral reading and mechanical aids should not be scorned at. If, with age his condition shows perman-ence, he needs guidance into a vocation demanding less reading.

Some of the current trends and basic concepts under-lying the principles of training slow-teachers and monitoring sucess from their training programmes are -

(1) Individual Educational Plans

(2) Behavioural statement of objectives

(3) Recording progres

(4) Behaviour modification Techniques

(5) Programming instruction through task-analysis.

CONCLUSIONS

The Report of a working committee commissioned by the British Council for Rehabilitation of Disabled summarised their findings as follows.

a) that a substantial number of children and adults are significantly handicapped by reading disabilities.

b) that many of those go through life with their disability unrecognised.

c) that the provision which is made for them is grossly inadequate.

d) that there is a considerable lack of knowledge about the nature of reading disabilities and of the kind of remedial help which might be given to those who suffer from it.

e) that there is far too little public knowledge of the extent of and the ways in which reading disabilities can handicap victims (19).

The past president of Orton Society, Mrs. Margaret Rowson, once remarked that if her work was able to generate the interest and optimism for learning disabilities, within the related fields of disciplines, she would feel well reqarded. The interest and optimism has been generated and the last century has brought in multiude of researches, in the United Kingdom and the United States, emphasising its multifaceted, complex nature, under the auspices of multiple disciplines interested in this field. What is more important now, is the collaboration of these disciplines and a joint effort at translating the research findings of one discipline to another and bringing it down to the level of teachers and parents for proper implementation.

There is an optimistic future for a child with learning disability, if he can be diagnosed early enough to

get remedial help under a sympathetic and understanding adult. The individual is a continuing entity- and the remedical work should be considered as a whole. The earlier it starts the more effective it would be :

If the third All India Concerence on Educational Research organised by ERIC can generate the interest of some researchers in India to study the behaviour of problem readers and the methods of teaching them, along with strategies of intervention programmes based on developmental checklists, the efforts of ERIC would be well rewarded.

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EDUCATIONAL RESEARCH & INNOVATIONS COMMITTEE
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

Theme: Education c the Disabled

C.H.K. MISRA

It is estimated that over 500 million people in the world today cannot take full part in all the common activities of daily life, for they suffer from physical, mental or sensory impairments, which might result in disability, causing difficulties for them in expected performances and ultimately they are handicapped. One fourth of these people are children, four fifths of them belonging to poor families from developing countries. By the year 2000 there will be at least 600 million disabled persons, one third of the world's population will be under 15 years of age living in developing areas and 150 million of these children will be disabled. Special care, treatment and education therefore is significant. The problem is complex and sizeable and the progress towards solution has been far too meagre. What could be done under the present circumstances to prevent such a calamity? Twenty one years ago the U.N. General Assembly had declared the Rights of the child. Declaration on the Rights of Disabled persons came in July 1900. Education can be a means of achieving them. India's National Plan of Action in the International Year of Disabled Persons also supports the theme of full participation and equality. The need to evolve a National Policy for the disabled which will help the disabled persons to realize education, training, employment, legal protections and to intensify efforts to organize training, care, guidance and work opportunities for them are contained among the objectives of the National Plan of action.

Statistical estimates of the number of disabled persons in India on various categories are not yet available. The National Sample Survey organisations is going to conduct an All India Survey between July and December 1981. There is a

felt need for trained personnel, adequate equipment for early detec ions and reliabilit es , tests and diagnostic devices. Equally important is the change of attitudes, towards the disabled, both inside and outside the school environment. Enrolment and education of a substantial number of handicapped children, schemes for scholarship, establishment of centres etc. have been taken as core services for the disabled under 14 years in this country in its National Plan.

Parental involvement for education of children with a special need has been recognised through recent research (Honig 1978). A Conference "Parenting Education of Handicapped Young Children" in May 1978 at Teachers College, U.S.A. is an instance of this awareness. A deepening and pervasive spread of child development concepts and knowledge has began to result, very gradually, in a healthy change in this treatment of children with special needs. It is being realized all over that stimulation, enrichment and optimization of growth of children are to begin early in order to prevent the severity of the effects of disability. More recently, researches by Klaus and Kennell (1976), Bell & Ainsworth (1972, Brazelton (1975) have demonstrated the power of early loving attachment between parent and child for its development. Since the handicap itself may already involve much frustration for a child, parent involvement is critical for such children. Ways by which parents can be involved may differ according to handicapping conditions and special needs, but it is significant to note that process variables which relate to developmental facilitation which the parents provide as well as their intellectual activity and expectation have proved far more important than status variables such as income or educational level of the parents (Honig, 1975). On the other hand, parents need advise

and orientation in order to overcome their usual sense of guilt and a tendency for overprotection. They also need guidelines for utilising aspects of the home environment for learning experience of the children.

The educator also needs far more knowledge, skills and attitudinal change in order to cope up with the challenge of educating the disabled. The existing teacher education programmes are grossly inadequate for this special requirement. Where such training exists, the conditions are not ideal. Commendable efforts are seen from voluntary agencies and public institutions in the direction. However, if an integral approach is to be taken, all teachers at all levels must be oriented. Many relevant issues regarding schools and schooling for the handicapped have been outlined (Birch, 1945). Approaches to individualization of educational materials for special children in the mainstream are also available (Anderson, 1970). Arguments for special programmes for special children (Thomas, 1980) are also put forward. Some of the theories are quite puzzling for the teacher. He needs practical guidelines for handling handicapped children effectively. He might be guided in issues regarding standards to be expected, effects of his own protection or rejection of the handicapped child, rewarding, punishing and a lot other practical information. Sandu (1974, 1976) has discussed school environment for handicapped children. Shankar (1977) has brought out the Indian situation for exceptional children.

In common with other problems of education, disability also cannot be dealt with as an isolated phenomenon. It too has an intimate and inextricable connection with other socio-economic variables, ideological issues, real priorities and insightfulness of the decision makers etc. Informed and

effective educational programmes ought to depend on research findings. Unfortunately no policy decision can be taken on the basis of sporadic and erratic research attempts, localized and often partial in view. Correlational, experimental, clinical, survey research, curriculum research, system studies and organizational studies, test development research programmes involving home, family, community, etc. Special training methods, vocationalization, self-reliance education, studies of cognitive, social and emotive development and special researches on different kinds of disability may perhaps be effective if they are conducted in a conserted and systematic manner. A two way interchange of knowhow will be necessary, since the social worker already engaged in serving the disabled would require a minimal orientation in research methods and the researcher engaged in more comfortable research pursuits within the framework of education may have to be oriented on the significance of the neglected field of education for the disabled. Other interactions would be necessary, with the medical practicener, social and behavioural Scientist, the expert in implements for the disabled and rehabilitation. Often community sources would have to be 'used' as research workers.

The scope of the theme extends beyond having to educate a given numbers of disabled children. The matter of educating people to prevent disability, prevention of accidents disably diseases etc. are also to be considered. Many impairments are reversible, if detected early. Effects of malnourishment is also well known. With experience gained from health education, it should be possible to tackle such related issues.

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